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Volume XLIII, Number 2/3, Summer/Fall 1997

Articles

- | | | |
|---|------------|---|
| <i>Nina Bascia</i> | 69 | Invisible Leadership:
Teachers' Union Activity in Schools |
| <i>Patricia M. Rowell</i>
<i>Brenda J. Gustafson</i>
<i>Sandra M. Guilbert</i> | 86 | Problem-Solving Through Technology:
An Interpretive Dilemma |
| <i>Anthony W. Bartley</i> | 99 | Enhancing the Validity of Portfolio
Assessment in Preservice Teacher
Education |
| <i>Grace V. Malicky</i>
<i>Moirra F. Juliebö</i>
<i>Charles A. Norman</i>
<i>Judy Pool</i> | 114 | Scaffolding of Metacognition
in Intervention Lessons |
| <i>Teena Willoughby</i>
<i>Mary Motz</i>
<i>Eileen Wood</i> | 127 | The Impact of Interest and Strategy Use
on Memory Performance for Child,
Adolescent, and Adult Learners |
| <i>Irene M. MacDonald</i> | 142 | Violence in Schools: Multiple Realities |

Research Notes

- | | | |
|--|------------|--|
| | 157 | Guidelines |
| <i>Keith F Punch</i>
<i>Beverley Moriarty</i> | 158 | Cooperative and Competitive Learning
Environments and Their Effects on
Behavior, Self-Efficacy,
and Achievement |
| <i>Medhat Rahim</i>
<i>Taralee Marriner</i> | 161 | Students' Attitudes Toward Physical
Activity: Specialist versus Nonspecialist |
| <i>Richard McLean</i> | 165 | Selected Attitudinal Factors Related
to Students' Success in High School |
| <i>Julia A. Nielsen</i> | 169 | Increasing Awareness of Learning
Disabilities |

Book Review

- | | | |
|-----------------------|------------|---|
| <i>Kelleen Toohey</i> | 173 | <i>Social Justice and Language Policy in
Education: The Canadian Research</i> by David
Corson and Sylvie Lemay |
|-----------------------|------------|---|

Centering on Margins: The Evaded Curriculum

1998 CASWE International Institute

May 31-June 1, 1998

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The CASWE (Canadian Association for the Study of Education) 1998 Institute offers a forum for articulating vital components of contemporary education that are frequently rendered invisible by existing pedagogy, curriculum, philosophy, policy, and school organization. Social justice and equity concerns have been constructed in particular ways, with a subtle or even conspicuous avoidance of alternative interpretations. Conference organizers hope to draw together perspectives that contest the centrality of the current "mainstream" of educational theory and practice and that encourage the development of strategies for shifting the margins.

We are particularly interested in education and social constructions of

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Submit proposals and/or address requests for additional information to:

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The deadline for the submission of proposals is *January 30, 1998*.

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Provide an abstract of approximately 100 words on a separate sheet.
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- Diskettes** If the manuscript is accepted for publication, please supply in electronic form on a diskette. WordPerfect for PC and Microsoft Word for Macintosh are the preferred software.
Mark diskette with originator's name and program used.
- Research Notes** Research Notes are brief notes on research-in-progress or recently completed research, 1,000 words excluding graphics and references. Provide e-mail address, fax, and/or telephone number. Detailed guidelines are given at the beginning of the *Notes* section.

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Nina Bascia

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Invisible Leadership: Teachers' Union Activity in Schools

This article explores the motives for, benefits of, and challenges to teachers' union involvement. Analyses of the union-related work of 35 teachers in 10 districts in Canada and the United States reveal how teachers' practical as well as ideological concerns encourage their assumption of organizational and political roles. The research also demonstrates the value of this work in terms of access to information, resources, and influence. By considering both the constraints and opportunities inherent in teachers who challenge the conventional boundaries of teaching roles, this article contributes to our understanding of both the current realities of teaching and the potential of schemes to professionalize teaching by encouraging teachers' extraclassroom work.

Cet article explore les motifs, les défis, et les bénéfices qui ressortent de l'implication des enseignants et des enseignantes à l'intérieur des syndicats d'enseignants. L'analyse de la participation des 35 enseignant(e)s aux activités de leur syndicat respectif dans 10 districts du Canada et des États-Unis révèle comment leurs préoccupations pratiques et idéologiques définissent les rôles politiques et organisationnels. En examinant aussi bien les contraintes que les opportunités inhérentes aux enseignants et aux enseignantes qui défient les frontières traditionnelles des rôles de l'enseignement, cet article contribue à mieux saisir les réalités actuelles de l'enseignement et les stratégies possibles de l'enseignement professionnel qui peuvent ressortir de l'implication des enseignants et des enseignantes dans des champs d'activités extérieurs à la salle de classe.

There have been many calls in recent years to expand teachers' roles beyond conventional classroom practice. Some United States researchers and policy makers argue that if schools are to serve better an increasingly diverse student population under changing social, economic, and technological conditions, teachers' greater participation and commitment are necessary—to improving their pedagogical skills; to developing effective curriculum and programs; in school governance; and in more substantive relationships with students, parents, and community members. In the currently popular rubric of teacher professionalism, these expanded notions of teachers' work are sometimes characterized as "teacher leadership" (Fullan, 1995; Little, 1988; Smylie & Denny, 1989) in the hope that such teachers will enable and inspire colleagues and students to better teaching and learning. Much effort has gone into formalizing and building teacher leadership capacity by recruiting particular kinds of people into teaching (Bascia, 1996; Fullan, 1993), developing new forms of teacher training (Cochran-Smith, 1991; Hargreaves, 1995), new school structures (Leithwood, Jantzi, & Steinbach, 1995; Lieberman & Miller, 1990), profes-

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sional organizations and networks (Hargreaves, 1996; Lichtenstein, McLaughlin, & Knudsen, 1992), and differentiated roles for teachers (Little, 1990a; Wasley, 1991).

Calls for expanding teachers' roles beyond the classroom are relatively new. Yet teachers have been working in a variety of extraclassroom arenas for many years, as department chairs (Hannay & Denby, 1994; Little, 1995), mentor teachers (Little, 1990a), and facilitators (Kilcher, 1992; Lieberman, Saxl, & Miles, 1988). Some teachers are released from the classroom to do this work; others carry it out in addition to full teaching loads. For some teachers it represents a stepping stone away from teaching and into other organizational positions; others understand it as enhancing classroom practice.

Teachers' federation, association, or union involvement, the subject of this article, offers teachers opportunities to participate in curricular and organizational development activities as well as access to decision-making, information, and resources—arguably the broadest range of activities and benefits of any teacher leadership role and a foundation for other teacher leadership work. Unlike other formal leadership roles, union involvement is available to most teachers on a voluntary basis; at the same time, it suffers from a somewhat negative reputation because of unions' association with politics and because the activities and relationships inherent in union affiliation challenge educators' conventional assumptions about expectations for teachers' work and authority. Siskin (1994) has noted that teachers often use the term *political* as a pejorative; according to Hargreaves (1995), the typical view of politically active teachers is that they are selfish, primarily interested in their own careers or pocketbooks, and working on projects that compete with students' classroom needs. Huberman (1989) suggests that teachers who "tend their own gardens" are less likely to face career burnout than those who engage in larger organizational ventures. Teachers who engage in political work in their own schools and districts often risk the discomfort or dislike of administrators and colleagues: teacher leadership is steady and difficult work, with few epiphanies and limited successes.

Union-active teachers exemplify recent notions of teacher professionalism, and yet often they must contend with personally and organizationally directed charges of unprofessionalism. Their brand of teacher leadership is driven by their own pragmatic concerns and values rather than by administrative designation; they often encounter collegial, administrative, and even reformers' criticism. As Little (1995) notes, this type of leadership is accomplished

through independent pursuit[s] ... or a course of action that [may oppose or subvert] institutional mandates; through the consolidation of trusting relationships.... [These teacher leaders] are distinguished not by formal positions within the school bureaucracy, but by the ideas and commitments they voice, the persistence with which they pursue and defend their ideas and actions, and by a record of accomplishments recognized by fellow teachers. (p. 61)

US teachers have been challenged by the specter of professionalism since the latter part of the last century. Teachers first organized in response to attempts by educational administrators and academics who wished to establish new bureaucratic school systems and based their right to regulate and control

teachers' conditions of employment in their own greater education and "scientific" expertise—employing a rhetoric of professionalism (Carlson, 1992; Gitlin, 1996; Smaller, 1991; Tyack, 1974; Urban, 1982). According to the logic of the new administrative order, teachers were by definition unprofessional, but might partly compensate by adhering to the methods of curriculum delivery, comportment, and other regulations ascribed by their superiors (Murray, 1992). Larson (1977) has suggested that unionism may have been the best strategic response available to a previously unorganized occupational group that now found itself subordinated by the new educational bureaucracy; Gitlin (1996) characterized early union efforts in the US as a form of political professionalization that attempted to protect and enhance teacher autonomy and authority. The emerging teachers' organizations focused on challenging new administrative regulations that restricted teachers' pay and job security and shaped the conditions of teaching in ways that teachers experienced as inappropriate, obstructive, and demoralizing.

Teachers' organizations have been compared, frequently and unfavorably, with the organizations of professionalized occupations such as medicine and law. During the 1950s and 1960s an academic interest in the construction of professional occupational criteria and the ensuing assignment of teaching to semiprofessional status (Etzioni, 1969) led to perceptions of teachers' organizations as both cause and symptom of teachers' subordination. Federal labor laws shape provincial and state legislation that delineates the parameters of collective bargaining and limits employees' (teachers') discretion to issues of wages, benefits, and working conditions. Issues concerning the substance and organization of work are considered the prerogative of managers (usually administrators). In Canada, where teachers' organizations have been written into most provincial Education Acts for about five decades, federations' capacity to set or influence educational policy typically has been restricted to an advisory role.

Teachers' organizations face persistent charges of unprofessionalism. Politicians in both countries frequently and publicly blame unions for the "poor" quality of public education. Provincial governments recently have established colleges of teachers in British Columbia and Ontario, touting them as "real" professional organizations. In both countries, but especially in the US, teachers' organizations have responded to criticism by taking up the crusade of teacher professionalization and participating in a number of projects intended to enhance teacher leadership in all the ways identified above (Bascia, 1991, 1994b, 1997a; Kerchner & Koppich, 1993). Although professionalism remains a powerful and persistent rubric for assessing the work of teachers' organizations, a major limitation has been the tendency to reinforce an institutional perspective on educational processes that perpetuates a notion of teachers' work as consistent, predictable, and uniform across space and time. From such perspectives flow recommendations for broad institutional solutions that attempt to improve teaching through policies and agencies that operate at some distance from teachers' actual work (Talbert & McLaughlin, 1994). Much of the literature on teachers' unions has been written from the outsider perspectives of administrators and policy makers, with less scholarly attention paid to how teachers themselves experience unionism.

For teachers the value of unions and of union involvement are rooted in personal experience, and those experiences vary. Provincial and state regulations depend on whether union membership is mandatory (as it is in many provinces and some US districts) or voluntary, and whether teachers have a right to legal representation (they still do not in 16 US states), but from teachers' perspectives, national and provincial or state differences in union strategies and organization pale in the context of local policies, practices, and histories (Olson, 1965). Teachers' personal and workplace realities cause some teachers to value union affiliation and others to fail to see its utility or relevance (Bascia, 1994a). Although some teachers perceive dichotomies between union work and a commitment to students, between political strategizing and curricular concerns, between the mundanity of working conditions and broader educational and societal goals, union-committed and involved teachers perceive these activities and issues as logically and practically linked.

This examination of union-related teacher leadership is based on data collected for two related research projects conducted between 1989 and 1994: an exploration of the value of unionism to a broad range of teachers in three secondary schools (Bascia, 1994a) and a study of the roles of union-active teachers in various parts of the US and Canada. In both studies union-involved teachers were asked to describe the progression of their teaching careers, including teaching assignments, extraclassroom and leadership roles; their motives for union involvement and the range of union-related roles and activities in which they were and had been engaged; the personal and professional consequences of their union work; and perceptions of how colleagues and other educators valued the union. In the first study interviews with a wide range of teachers and administrators provided extensive information about school and district context, including educators' perceptions of local union strategies (Bascia, 1994a). The analyses are more peripherally informed by studies of teacher-staffed, union-sponsored reform initiatives in Ontario and California (Bascia, 1991; Bascia, 1994b).

The 35 teachers whose union involvement is described in this article worked in six Ontario, one Ohio, and four California school districts. The districts ranged in size from a four-school board in rural Ontario to a California urban district with over 150 schools. The settings differed in ways that appeared to shape the ways teachers think about union involvement: in Ontario, federation membership is a condition of teaching employment, administrators are represented by the same organizations as teachers, and teachers currently belong to one of five organizations depending on the type of school in which they teach (and in public elementary schools women and men belong to different organizations; Mawhinney, in press). In the US, teachers in three districts were represented by affiliates of the National Education Association (NEA); some still remembered the days before collective bargaining when administrators dominated what were known as "professional associations"; teachers in the two US districts affiliated with the American Federation of Teachers (AFT), on the other hand, took pride in referring to their organizations as "unions."

Appendix A provides information on the teachers' relevant demographic characteristics, their teaching assignments, and extraclassroom roles. In Ontario the teachers interviewed were all elementary teachers; all but one were

contacted through the provincial Federation of Women Teachers' Associations of Ontario (FWTAO) and selected to ensure distribution across union-related activities and geography. In the US sites teachers selected for the study reflected a comprehensive cross-section of union- or association-active teachers in distribution across gender, race, subject areas, grades, years teaching, and other leadership roles. The US teachers were, perhaps surprisingly, disproportionately female; Appendix A reveals local patterns in gender as well as additional school roles. The teachers' union roles and activities ranged from minimal involvement in their school setting (e.g., distributing information, serving as a conduit between teachers and union leadership) to more extensive activities (surveying teachers about their concerns, representing teachers in meetings with school and district administrators, developing district and school policy). Several were involved in union committee work or union-sponsored reform initiatives; many had actively participated in overt political activism; several had served or were serving in elected leadership roles.

Provincial/state and local contexts appear to be strong influences on how teachers in general think about and value teacher unionism (Bascia, 1990, 1994a), but there are many cross-site similarities in teachers' motives for becoming union-active, the benefits they gain through union activity, and the challenges they face in the context of this work. The sections that follow reveal these patterns, linking them with and contributing to the growing bodies of literature on teachers' life histories and the policy, administrative, and social contexts of teaching.

Which Teachers and Why

The teachers interviewed in the studies tended to identify strongly with their federation, association, or union, and characterized their union work as "an integral part of who I am professionally." An Ohio union official said her role was "a vehicle for me to do what I believe in." The teachers responded to the challenges of teaching through organizational involvement rather than disengagement. Some teachers spoke of taking turns as union representative (steward, key teacher, "rep") just as they shared other responsibilities in departments, grade level divisions, and among those in similar roles across a district. A California secondary teacher "realized that the union is us, and if we're unhappy then it's our own fault, because we could be that leadership or we could be knowledgeably voting for proper leadership. We're only as powerful as we make ourselves." Union-active teachers typically expressed a sense of ownership and entitlement: "this is our union," or "this is my school," "my district," "our profession." Some teachers came to union involvement to fulfill a general advocacy role: for an Ontario elementary teacher it was helping female colleagues fight for equitable treatment in a male-dominated school board; for a California math teacher it was "giving support to teachers who have issues that come up in their professional life that are overlooked." They expressed their interest in unionism as "a way to improve the quality of education," and more practically as "a rational way to solve problems." Most teachers said they were motivated by beliefs that organizational involvement would support their advocacy work on behalf of educational programs, colleagues, and students. Rather than seeing their own interests as antithetical to

their commitment to students, most teachers perceived a strong positive relationship between support for teaching and teachers and support for student learning. A secondary journalism teacher and local union vice-president said,

Most of what we work for is for the betterment of education, a commitment to the students as much as me being here and working with them during the time that they're here, that's a commitment that I try to fight for smaller class sizes, that I try to fight for more [classroom] aides, that I try to fight for better teachers, whatever.... It's naive to think "I'm only here for the kids, I just want to focus on my classroom and the kids and ignore all the rest of it."

The variety of teachers' opinions on the utility of unions in and of itself challenges the notion of a one-size-fits-all concept of teaching. Fine-grained analyses of teachers' work patterns suggest the presence of what Hoyle (1974) called "extended" as well as "restricted professionalism" in the teaching force. The extent to which teachers maintain relationships and assume tasks beyond their classrooms is simultaneously a personal, social, and structural phenomenon. Some union-active teachers' commitment to union work appeared imported, so to speak, from their personal to their professional lives. Economic necessity, the need to support themselves and their families, drove some teachers to union involvement. For some teachers, a family history of union involvement meant it "was just part of what you do as a teacher." Other teachers attributed their union engagement to personal tendencies toward leadership or organizational involvement (scouting, other professional associations, community organizing, or governmental politics), personality ("It's sort of a need of mine to get out and to take some risks and meet other people and be in different situations, it's my own personal growth"), or being at a point in one's career where one was seeking new professional challenges. For this last group of teachers, union involvement was part of the exploratory process; this was as true in districts where teachers' union involvement was out of the question for teachers seeking administrative advancement as it was in Ontario, where federations have direct involvement in identifying teachers as potential administrators. More broadly shared professional values about how autonomous or collaborative, classroom-focused, or more broadly active teachers should be are shaped by policy patterns and administrative ideologies (Broadfoot & Osborn, 1993; Louis, 1990). Working conditions in particular districts and schools engender different expectations and possibilities for teaching-related tasks (Hargreaves, 1994; Little, 1990b; McLaughlin, 1993; Talbert & McLaughlin, 1994). Where administrative response to teachers' resource and support needs is low, teachers' union commitment and involvement may be greater than where teachers feel their work is better administratively supported (Bascia, 1990). In the two studies, union-active teachers and union officials reported instances of whole school staffs, or of strong factions within schools, for whom union affiliation was out of the question and who perceived union strategies as irrelevant or obstructive; in other schools or academic departments, union activism is a strong element of teachers' shared professional identity (Bascia, 1994a).

In any educational setting, teachers possess different values and take on different roles. Their personal and social characteristics (Bascia, 1996; Foster,

1994; Goodson, 1992; Henry, 1992; Metz, 1990; Reynolds, 1990), as well as their teaching assignments (Ball, 1987; Riseborough, 1984; Siskin, 1994) interact to shape their teaching goals, relationships, resource requirements, and preferred activities. Many union-active teachers in these studies filled other leadership roles (e.g., department chair, school governance council chair, district professional development committee coordinator): for them union affiliation was another venue for ensuring access to information and involvement in decision-making. One union representative explained the importance of representation for special services (psychologists, language teachers, and nursing) staff: “because we are unique in that we do not have a home school, that we travel; our problems are often different than [regular] teachers’ problems.”

A significant number of union-involved teachers, especially in the US sites, carried responsibilities for low-status students or programs, such as special education, English as a Second Language (ESL), industrial arts and art. Teachers with low-status students may be particularly sensitive to school scheduling, discipline, curriculum, and professional development policies—all union issues, and all issues that may be differentially available to teachers according to the status of the students and programs with which they are affiliated (Finley, 1984). One California union representative characterized a need for special advocacy for her school, which had a higher proportion of immigrant and lower income students than other schools and did not, in her estimation, receive the level of financial and moral support it needed from the district. An elementary special education teacher characterized her union involvement as a deliberate strategy of “always trying to be on committees and be really a part of the group as much as I can be. It’s important for me but also for my students: I feel that if I’m respected then the students are going to be more respected in their classes in the mainstream.” A number of teachers in the study were responsible for subjects such as industrial arts and art, which suffer a lower status than those subjects considered core or essential to a school’s academic program (Goodson, 1988; Little, 1993, 1995; Siskin, 1994). The California union representative who chaired his high school’s art department described his subject area as the “bastard child of any curriculum, [math and science] have a real good valid reason for funding [but] we have to really scream and holler to get funds.”

Personal characteristics and experiences influence teachers’ willingness to assume union-related activities, but the structural conditions of teachers’ work appear at least as significant. The apparent strength of workplace context generates some surprises: for example, the preponderance of teachers with lower status student or program responsibilities, rather than higher status positions, and the preponderance of female teachers in union roles—perhaps because of their greater numbers in lower-status programs (Acker, 1983; Ball, 1987) because of the uncontested nature of these leadership roles, or because of career or work patterns common to female teachers (Bascia, 1997b).

The Benefits of Union Involvement

Union involvement provides a variety of enhancements to teachers’ daily work. By virtue of their offices, school union representatives (stewards, key teachers, reps) may develop more intensive and effective working relation-

ships with other teachers and administrators than those typically available to teachers. Union-active teachers can initiate and influence policy decisions in school, district, and union. Access to program and policy information as well as the realities of teaching in other schools allows them to understand better the workings of the educational system and to plan and develop new programs and policies. Formal training and experiences in various educational settings provide important learning opportunities. Through an expanded network of contacts teachers are able to broker new resources and program possibilities. Union colleagues can provide a sense of community support, inspiration, and guidance not always available in school settings. This greater access, influence, understanding, and professional community are important supports for teachers who understand their work as including elements of student, collegial, or programmatic advocacy or who are interested in expanding the boundaries of their work.

Through the union itself, these teachers could help identify contractual issues and develop policies and procedures with far-reaching impact on teaching, such as scheduling of annual calendar, resource and staff allocation, options for professional development, and in some cases procedures for teacher and administrator hiring, evaluation, and promotion. Many union representatives reported special working relationships with school administrators. A secondary school union representative described the types of issues involved as "small kinds of things ... most of the time the minute we go in and discuss it, the problem gets solved." Some representatives served as a sounding board for administrative ideas or strategies (Bascia, 1994a).

Unions provide many opportunities for involved teachers to expand their knowledge and skills. Summer and weekend courses and workshops provide training on traditional union issues like grievance procedures and arbitration; leadership development is another common focus. Teachers' organizations in the US hold conferences on a variety of school reform ideas. Where teachers' organizations are involved in school reform union-active teachers have first claim on opportunities for involvement in innovative projects such as teacher education programs administered collaboratively with local universities, curriculum development efforts, professional development programs, and induction and peer coaching. Union-active teachers can develop useful organizational perspectives by participating in decision-making sessions, by hearing and considering the implications of teachers' experiences in a variety of school contexts, and by greater access to collegial and administrative perspectives in their own schools.

Union involvement provides opportunities for teachers to get to know and work with educators beyond their own schools—to create and sustain professional communities across time and space. Union-involved teachers reported receiving social support for their work from the body of union-involved teachers with whom they met monthly, worked on special projects or political campaigns, and whom they perceived as colleagues by virtue of their shared concerns. "I felt listened to, I felt like the teachers, the reps there, could relate to what I was saying, 'Oh yeah, that's a problem at our school, yeah.'" Affiliation with other union-active educators can put teachers in contact with other teachers they find admirable and worthy of emulation.

Constraints

For many union-active teachers, the benefits of enhanced access and authority are significant for their own daily and longer-term work as well as the quality of teaching and learning for colleagues and students. But the teachers in the studies also emphasized how administrative practices, the temporal and spatial organization of teachers' work in schools, the multiplicity of activities that teaching and teacher leadership demand, the normative context of teaching, and the dynamics in union organizations could be serious constraints to the success of their work. These complications suggest the challenge of, but also the necessity for, teachers' extraclassroom activities—always available, always necessary, and frequently risky.

Union representatives characterized their work as significantly influenced by administrators' decision-making authority. In some schools and districts union representatives discovered their ability to advocate seriously constrained or sent underground. Several teachers expressed bitterness about what they had learned about "how teachers can be treated." "We've been lucky" is the way one union representative characterized his principal's responsiveness to teacher concerns. Another said, "It varies from school to school. I think it really makes a difference when you have a situation where the administrator is thought to be good for a lot of things, but he still holds all the cards." Many educators reflected critically on the durability of traditional hierarchical authority relations. Male representatives were more likely to invoke the power of the contract or the authority of elected union leadership; female representatives tended to emphasize informal and unobtrusive negotiation: "Probably one of my strengths is I always try to see both sides, try to talk to the person" (Bascia, 1997b). In some settings, whatever their preferred intervention strategies, teachers' relationships with administrators were subject to continual renegotiation and renewal; vigilance and persistence were the operative terms.

Keeping a finger on the pulse of a school was a challenge for many of the union-active teachers. In some schools the availability and use of common staffrooms and high levels of trust and communication among teachers meant that a union representative could get a good feel for school issues by spending time "down in the lunchroom, [the teachers are] talking and they're venting some of their frustrations, and sometimes I [can] see a pattern in their frustrations." Large or "Balkanized" schools (Hargreaves, 1994), where teachers spent much of their time alone or in isolated programmatic clusters, made representation and advocacy challenging; in such schools significant difficulty lay in teachers' tendency to define their issues in separate, discipline- or program-specific ways and not to be aware of or to identify with other teachers' realities (Bascia, 1994a). Some secondary union representatives limited their attention to departmental affairs and hoped others would take responsibility for other parts of the school. Representatives might rely on other teachers' incentive—"If staff members don't make their feelings known to us, we have to [vote] with our best judgment. Sometimes that's with rather limited background knowledge"—or on serendipitous encounters:

They catch me when I'm at the ditto machine or in the library or the ladies' room, wherever it is that I happen to be. If they're on your mind, and you want to get back to them, you hope you pass each other again.

The complexity of teachers' work often tended to render union work invisible to other teachers; even in smaller and organizationally cohesive schools many teachers were not sure who their representatives were, and reps found it took serious commitment to figure out how to share information effectively.

Union presidents often are released from teaching to carry out their duties, but rarely are lesser union officers or school representatives. A local federation officer in Ontario characterized her role as

enormous responsibility with no financial reward and only some reward in terms of release time, but even that's sort of questionable because you've got to prepare to be away from class and then you have to pick up the pieces when you get back—it's sometimes not even worth it.

Teachers already managing a department or program might be able to utilize routine meetings and contacts to carry out union-related work, but sometimes the very concerns that engendered a teacher's interest in union affiliation created time demands that made the entire set of activities unmanageable. Teachers juggled responsibilities: A secondary union representative in California, pursuing a master's degree at night school, requested that her principal release her from her duties as department chair. An elementary teacher gave up a formal union role for other professional activities and work on a master's degree, but stayed connected to the union informally. Personal as well as professional time plays a part in teachers' initial decisions to become union active as well as the depth and breadth of their activities once they assume union positions. Teachers with familial obligations must weigh the daily costs of a role that might require after-school, evening, and weekend time (Little, 1992; Robertson, 1992). A female elementary teacher in California reported, "I will do it another year but it's too much away from my family and my teenagers." Several representatives reported strains on their marriages as a result of their union involvement: "It becomes a conflict, there's only so much of you available and if you're spending a lot of time in the Association, you're probably not home much."

Teachers' involvement in extraclassroom work is partly framed by their calculations of the time the role requires and its value relative to other responsibilities and interests. These concerns limit the number and types of teachers willing to fill union roles: although there were exceptions, union-active teachers tended to be those without highly demanding familial obligations, and those beyond the first, most intensive years of their teaching careers. Despite, or perhaps because of, their relative rarity among any group of teachers, union-active teachers felt they had been charged with significant responsibility: "It was almost expected: 'You're the union rep, you go do it,' and other people didn't even come from the school to help out. Because you're the rep, you've got all the responsibility." In every setting union-active teachers reported that the small number of teachers willing to involve themselves for any length of time in union affairs meant that "the same group is doing everything." "If you ask

most of the people who are the key players, they're not on one thing, they're on 10."

The interviews suggest that colleagues' assumption of greater organizational responsibilities or skills is rare, despite representatives' attempts to model "assertive relationships with administrators" and create forums for teachers' engagement in schoolwide issues. "The teachers come to me with stuff that they should handle," said an Ohio elementary teacher. A California high school representative said her colleagues

want to gripe about the decisions they don't like but they don't want to spend their time making [new] policies ... Every time you turn around someone's coming to you to solve their problems. To this day there are people on staff who think that they can just tell me and that's the end of it.

At another California high school, according to one union representative,

[Teachers have] got opinions but they don't really express them very well unless you survey or unless you have an open meeting and even then a lot of them don't come. They're very busy. Maybe they feel it doesn't make any difference.

Union representatives in traditional school settings understood their advocacy work for colleagues as ongoing and their achievements as piecemeal.

A viable teachers' organization provides a forum for discussion of salient issues, where leadership is responsive, and where teachers can undertake discussion and projects consistent with their own priorities and values; some unions fall far short of these ideals and actually constrain teachers' involvement. Some union-active teachers reported that time spent in meetings on minutiae frustrated teachers who would rather focus attention on broader educational issues and directions, and that meeting dynamics can become dominated by the rules of order or limited by the time constraints of the school day and year.

The meetings are sort of boiler room: we come in at 3:30 and we have a whole list of things to do and then we go boom, boom, boom, right on business, and then we usually don't finish till around 5 and then everybody leaps up and charges out ... I haven't had any opportunity to establish any sort of relationships yet with anybody I don't already know.

When union organizations mirror the hierarchical distances of the administrative order of the school system, teachers can be inhibited from participation (Bascia, 1994a). Teachers may become disenfranchised when policy discussions become the exclusive purview of elected leadership. In such circumstances union-active teachers may become apathetic—or they may take matters into their own hands: "There was nothing wrong with the strategies [union leadership] took, but they couldn't discuss things, sometimes it wasn't apparent to us what the strategy was, so we initiated our own job actions here at school."

Invisible Leadership

Despite its limitations, for teachers committed to improving the quality of working conditions for their colleagues and educational opportunity for students, union involvement provides unique possibilities for advocacy work by creating a variety of forms of access to schoolwide, district, and other educational forums. Many of the teachers interviewed for the two studies indicated

that their work went unacknowledged by most colleagues and administrators. "Teachers don't realize what I do for them," said a secondary school union representative. "When I try to recruit other teachers [to union involvement] it's clear they don't know what's goes on." Especially at the school level, union roles are neither high-profile nor high-status positions; union representatives ran unopposed for office in every case reported in this study. "He's elected. Because no one else wants to do it," said one representative, referring to another at the same school. "I'll do it for a while. I don't think the staff cares." Teachers' satisfaction with union work must be rooted in the benefits of program and student support and the support and recognition of union colleagues within the district organization.

The notion of teacher leadership often evokes images of heroic or charismatic individuals, driven by a vision of a better world, who through their efforts and influence can inspire changes in the behaviors and values of followers. Union-active teachers' work, on the other hand, often requires circumspection and diplomacy in relations with colleagues and administrators, diligence, and a willingness to be content with small, short-term victories. Although their work extends beyond conventional classroom teaching and blurs the boundaries between teaching and administration, the concept of teacher leadership exemplified by union-active teachers often is less about a movement away from teaching and classroom concerns and more about a commitment to students, colleagues, and educational programs.

Teachers' federation, association, or union involvement provides an opportunity to understand the practical as well as the idealistic concerns and the personal and structural conditions that encourage teachers to take on extraclassroom, political, and organizational work. This work is carried out in and around the administrative and social organization of schools, is sometimes reactive or protective, and other times proactive; its achievements are often routine and sometimes extraordinary; they are sometimes visible to others, sometimes inspirational, but more often unacknowledged. In the light of some teachers' priorities and teaching responsibilities, union roles and contacts are essential. One hundred years of educational history suggests that both the rhetoric of teacher professionalism and teacher leadership policies will fall short of their intended goals unless greater attention is paid to the ways teachers themselves define those terms and take up that work.

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Appendix A

Respondents in this Study

<i>Gender/#</i>	<i>School Level/ Subject</i>	<i>Years Teaching/ Union Active</i>	<i>Other School, District Roles</i>	<i>Union Roles</i>	<i>District, Province, or State</i>
F1	Elementary/ Special education	15/4	Superintendent's advisory committee, Special services advisory committee	School rep and union vice president, elementary	"Hiram"/Cal.
F2	Elementary/ ESL	15/2	District professional development committee, Special services advisory committee	Special services teachers' union rep	"Hiram"/Cal.
F3	Elementary	25/23	District professional development committee	Former rep, former union vice-president;	"Hiram"/Cal.
F4	Intermediate/ English	8/3		Former union rep; Union secretary	"Hiram"/Cal.
M1	Intermediate/ ESL	13/5		Former union rep; union president	"Hiram"/Cal.
F5	Intermediate/ Social Studies	34/26	Former chair of social sciences; District ombudsperson	First union president; Former union rep, Trust agreement	"Hiram"/Cal.
F6	Secondary/ Special education, Voc. ed	20/7	Former department chair, former school learning team chair	Former union rep; District p.d. committee	"Hiram"/Cal.
F7	Secondary/ English	20/2		Union rep	"Hiram"/Cal.
F8	Secondary/ English	11/3	District staff development committee	Union rep, vice-pres., secondary	"Hiram"/Cal.
M2	Secondary/ Science	27/24		School rep, former union pres.	"Adobe Viejo"/Cal.
F9	Secondary/ Math	23/22		Alternate union rep	"Adobe Viejo"/Cal.
F10	Secondary/ English	(retired)		Former union rep; involved in retired teachers' association	"Adobe Viejo"/Cal.
M3	Secondary/ Social studies		Department chair	Former union rep	"Mostaza"/ Cal.
M4	Secondary/ Science	18/15	Former department chair, learning house leader, governance council chair	Union rep	"Mostaza"/ Cal.

<i>Gender/#</i>	<i>School Level/ Subject</i>	<i>Years Teaching/ Union Active</i>	<i>Other School, District Roles</i>	<i>Union Roles</i>	<i>District, Province, or State</i>
M5	Secondary/ Science		Department chair	Union rep	"Mostaza"/ Cal.
M6	Secondary/ Science	4/3	Learning house leader	Alternate union rep	"Mostaza"/ Cal.
M7	Secondary/Art	20/	Department chair; former learning house leader	Union rep	"Mostaza"/ Cal.
F11	Secondary/ Special education	5/1		Union rep	"Oak Valley"/ Cal.
F12	Secondary/ Special education	12/2	Department chair	Union rep, union secretary	"Oak Valley"/ Cal.
F13	Secondary/ Science	8/3		Union rep	"Oak Valley"/ Cal.
F14	Secondary/ Math	18/5+1		Union rep, union p.d. committee	"Oak Valley"/ Cal.
F15	Secondary/ English	17/1	Reading lab coordinator	Former union rep	"Oak Valley"/ Cal.
M8	Secondary/ Industrial arts	20/7		Former union president	"Oak Valley"/ Cal.
M9	Secondary/ Industrial arts	16/3	Colloquium rep	Former union rep	"Oak Valley"/ Cal.
M10	Intermediate/ History			Former union president	"Oak Valley"/ Cal.
M11	Intermediate/ Social studies	22/20		Union newsletter editor, intermediate v.p.	"Rivertown"/ Ohio
F16	Elementary/ Special ed	13/9		former sergeant at arms, community relations	"Rivertown"/ Ohio
F17	Elementary	27/25		Former delegate assembly member, grievance officer	"Rivertown"/ Ohio
F18	Elementary	12/3		Union steward (school rep)	"Rivertown"/ Ohio
M12	Elementary/ ESL	30/10	Regional staff developer	Key teacher (school rep), federation newspaper columnist	Suburban A/ Ontario
F19	Elementary/ French	25/3		Former key teacher, public relations committee	Town B/ Ontario
F20	Elementary/ Special ed	20/4		Key teacher	Rural C/ Ontario

<i>Gender/#</i>	<i>School Level/ Subject</i>	<i>Years Teaching/ Union Active</i>	<i>Other School, District Roles</i>	<i>Union Roles</i>	<i>District, Province, or State</i>
F21	Elementary/ Music	26/22	Vice-principal, principal	Former federation president	Suburban A/ Ontario
F22	Elementary	30/8	School board equity officer	Former federation president	Suburban D/ Ontario
F23	Elementary	24/22	School board administrator	Federation p.d. committee, leadership course	County E/ Ontario

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Problem-Solving Through Technology: An Interpretive Dilemma

This article focuses on the dilemma of how to characterize technological problem-solving in a classroom setting. Curricular orientations to problem-solving in technology education, particularly the problem-solving-through-technology components of the Alberta Elementary Science curriculum, are interpreted through a juxtaposition of engineers' characterizations of technological problem-solving derived from transcribed interviews with 20 professional engineers. It is argued that problem-solving through technology bears little resemblance to real-world technological problem-solving.

La caractérisation de la résolution de problèmes technologiques en salle de classe pose un dilemme que cet article cherche à cerner. Par la juxtaposition des caractérisations de la résolution de problèmes technologiques relevées des transcriptions des interviews avec 20 ingénieur(e)s professionnel(le)s, nous interpréterons les orientations de la résolution de problèmes en éducation technique à l'intérieur des curricula, et en examinant, d'une façon particulière, les composantes du curriculum des sciences à l'élémentaire de l'Alberta Education. On soutient que la résolution de problèmes par la technologie ressemble très peu à la résolution de problèmes technologiques dans le monde réel.

Introduction

Technology is all around us; indeed it pervades our daily lives. Moreover, the products of technology are changing continuously, constantly influencing our ways of living and thinking. So it is somewhat surprising that direct study of this major contributor to our cultures has been introduced into elementary schools only relatively recently.

The introduction of a problem-solving-through-technology unit at each grade of the revised Alberta Elementary Science Program of Studies (Alberta Education, 1996) in September 1996 has been welcomed in many sectors of the community. The reasons for this are diverse: classroom teachers are enthusiastic about opportunities for active learning, professional engineers anticipate increased interest in their occupational work, and the world of business and industry hopes for a more enterprising and competitive work force. But what is

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this activity referred to as problem-solving through technology? Is there a discrete set of generic skills and procedures that can be taught and learned for the purpose of solving problems? And what are the implications of inserting problem-solving through technology into a program of school science? In this article we seek to address these and other questions.

The term *technology* is subject to many interpretations, and we do not intend to discuss these here. In our analysis, we use *technology* to refer to human activities motivated by demands for artifacts that will perform specified functions. From this standpoint, technological problem-solving refers to the engagement of people in activities that lead to the generation, development, and use of such artifacts. The purpose of this article is to examine the ways in which technological problem-solving is characterized by engineers (who comprise one group of people oriented to such activities in a great variety of fields) and to juxtapose these with curricular orientations to technology in elementary programs in general, and to the Alberta program in particular. We discuss two plausible interpretations of the curricular guidelines for problem-solving through technology and consider the implications of the engineers' characterization for program development and classroom practice.

Data derived from audiotaped interviews with 20 (10 female, 10 male) professional engineers has been analyzed to generate recurring themes in the characterization of their work. The identity of transcript sources are indicated as female/male (F/M) and a keyed number.

Engineers' Perceptions of Technological Problem-Solving

All the engineers who were interviewed¹ used the label *problem-solving* to describe the nature of their work. Many offered a summary of their activities along the lines of *first, define the problem, then identify possible solutions, and, finally, assess which solution is best*. However, when asked to describe how they were tackling a current problem at work, their responses revealed a much more complex set of interdependent activities than that suggested by a linear summary. The engineers' perceptions of these activities are portrayed in three clusters: defining the problem, making choices, and achieving a solution.

Defining the Problem

Deciding what the problem is and what kind of action is required is considered by many engineers to be the most difficult part of their work. Because the problematic features may not be obvious when first encountered, an engineer needs to set the problem in such a way that it comes to be known. This complex activity is likely to be labeled as *identifying* or *defining* the problem, and is accomplished at two levels: the big picture and the focused piece of the picture.

The big picture. For many of the engineers the starting point for solving a problem is getting to know the contexts in which it is located. This is needed because problems are characterized not only by their technical features, but by their potential social, economic, and environmental consequences. So an understanding of contextual relationships is needed to gauge the importance of the problem and its probable impact on various fronts. For example, an engineer responsible for maintenance of underground structures holding telephone installations noted, "I like to try to get a big picture view: How

important is this? What's the impact if I do it? What's the impact if I don't do it?" (F5).

The contextual history of specific types of artifacts contributes to understanding the ways in which past and existing solutions to problems were conceptualized, developed, and implemented. Commenting on his first encounter with bridge designing, an experienced civil engineer noted, "I had no idea that the history of what was there had anything to do with designing a new one [bridge]. You have to, in bridge design, know your river" (M9). In order to see a problem in its historical, social, and economic contexts, it may be necessary to assemble evidence from past planning documents, other agencies, or oral accounts of people with knowledge of the locale where the problem is situated, as well as from site visits. One engineer, assessing the need to replace 70-year-old pipes in a city neighborhood, considered a visit to the area to be valuable in getting to know the situation. She said,

Also, what's really important to me is to get a visual feeling for the neighborhood, and luckily for me, it's a five-minute drive over there. Within a couple of hours I can have driven up and down every single street. I can have a feeling for just how difficult or what kind of an impact a program of ours could have on a neighborhood that's in a pocket. There isn't access from a lot of different angles in there so you have to be careful. (F1)

Talking with people is invariably an important part of putting together the big picture. An environmental engineer embarking on an audit of the soil condition of airports began by researching and setting the problem in the context of specific situations. He described the reliance on undocumented information from people who had been around for a long time in much the same way as did the previous engineer dealing with neighborhood pipes:

Usually we try and get names from [the airport manager] of people who have been around for a long time because a lot of things that happened in the past aren't recorded. So what we'll do is really based on interviews and research; we'll determine where there is potential contamination, so that's the first step, is the research. And then we'll go on site and actually determine whether or not there is a problem on that site. First of all we do the background, and then we go on and find out if there is something. (M10)

The piece of the picture. As a view of the whole is assembled, engineers attempt to focus on features of the situation that make this particular problem distinctive. Participants talked about setting boundaries around a problem to make a space to contain it such that it will be both knowable and doable. This can be achieved by stipulating certain assumptions in order to proceed with a finite (as opposed to an infinite) problem. In the following example, temperature is assumed to be within a certain range for maintenance of equipment in Alberta but, as the engineer points out, this may not be an appropriate assumption: "We kind of think these are the boundary conditions, which are usually between -40C and +50C or something, but sometimes those don't apply. We find that it gets colder in the north than we thought it would and that the equipment doesn't work" (F3).

By imposing such boundaries engineers can employ previous knowledge and experience. They can also draw on their knowledge of science principles as

a tool for solving problems. As engineers described their use of science in actual projects, it was clear that science is pulled into the problem space only as it is deemed necessary. The science knowledge needed in a particular problem is chosen; as one engineer said, “You have to be selective in what you use, the knowledge that you have, and what you can actually use. I think that’s something you determine over time. That’s why a senior engineer is valuable, because he knows what works” (M10).

The interactions between the imposed boundaries and the contexts of the big picture result in a dynamic (rather than static) space, shaped by tensions among the resources at hand, clients’ expectations, legislative regulations, and so on, and by shifts in the larger contexts. An energy marketing manager for a large power corporation expressed it this way:

The problems I work with are very dynamic, and often our own internal positions will change because the dynamics have changed. Whether it be on the energy marketing side—the market has changed; or if there was a monsoon coming through, [and so] there’s lots of water behind the dam. So we have to change our position or they had to spill water. So now we have an opportunity to change our position; even though we don’t own any water, it has an impact on us. (F4)

Thus defining a problem is recognizing this interplay among factors inside and outside a specific situation and being prepared to reshape the problem in response to changing contexts. It is a complex interchange to achieve what one engineer described as having “an idea and you have to somehow make that fit the space you have” (F7).

Making Choices

Fitting the space requires choosing between alternative possibilities that take into consideration not only technical specifications, but also criteria imposed by social, economic, and production conditions.

Iteration. Several engineers talked about choosing paths to follow. There is a back-and-forth movement, an iteration, between possible paths as the constraints of resources, technical feasibility, and client expectations are appraised. The give and take among the impinging factors leads eventually to mapping a provisional path, along which the back-and-forth movement continues until the final stages of production of the artifact. These activities leading to the making of choices are not linear in their progression, nor do they follow a fixed cyclical pattern, but they do appear to be characteristic of technological problem-solving.

Strategies. So are there strategies that engineers use to help with the complexities of multifaceted problems? How do they go about making the decisions needed to map a path forward? Talking with people is an important part of making choices. The value of face-to-face interactions goes farther than merely pooling ideas; it is perceived as a means of intuitively sensing the preferences of a client or supervisor.

So I like to go and speak to that person that has requested it. A conversation for an hour, I always learn something more than what was written down. You get a little bit of a feeling for maybe what their first choice would be, even though they

haven't put that down on the paper. You get a feeling of what their first choice is. I like to design something the way that people want to see it. (F1)

Participants said they adopted procedures according to the complexity of a particular problem. Some indicated that they sort the knowns from the unknowns; calculations might be done to predict anticipated relationships and tests done to substantiate these. Other engineers described a process of *compartmentalizing* or *sectionalizing* a problem into a collection of smaller sub-problems that can be worked on in parallel. Clearly, although the participants did not lay out a single set of steps for choosing a critical path, ways of thinking involved analysis of the situation interwoven with knowledge of prior experiences.

Achieving Solutions

Although *finding a solution* is a phrase used by engineers in summarizing their activities, this description (like that of defining the problem) is misleadingly simple. Clearly solutions to problems are not found or discovered, but selectively constructed to achieve a satisfactory outcome that satisfies the often contesting criteria of the situation. The engineers in this study stressed the importance of working with people to achieve solutions as impinging factors are weighed against each other.

Working with people. Many of the engineers perceived their work of solving problems to entail interacting with people as much as interacting with materials; a typical remark was, "It's a lot of dealing with people as opposed to dealing just with technical things" (F6). They emphasized the interdependence of communicating with the phases of setting the problem and making choices. As two participants noted, "If you're trying to solve the problem in isolation, on your own, you're making it harder than it has to be" (F1) and, "You've got to be able to talk with people and find out, get their input on things. If you don't get along with people, they don't help you out. They'll let you make really stupid mistakes in your designs and you get something built and you realize this isn't going to work" (F7).

Obtaining assurances from gatekeepers in the larger context of the problem that the boundaries set are acceptable is an important dimension of developing a solution for an engineer whose projects are situated in an urban complex. In the following description the engineer outlines her perspective on her work with people:

The planning process is sort of contorted as far as which bureaucrats you have to know and who will help you get things done in other departments and the most easily. To me, that was the biggest revelation, finding out how to get things done very efficiently and quickly. And it wasn't the obvious route. And it's not written down anywhere, how you go about coordinating. (F5)

Sustaining focus on the problem. The engineers emphasized that it was important not to lose sight of the problem when dealing with the details of a design question. One participant described her experience of "going ahead and designing something and not realizing there was a problem to be solved first" (F1). She said:

I've just finished designing now, a very straightforward valve assembly to go into an existing pipeline, just to provide a bit of isolation for our customers. If we ever had an emergency situation, we could shut the valve and close off an area, seal the area ... I changed the location of it to what I thought was a better location to serve the request of isolating an area. I quickly designed it and thought this would be fine. And didn't really look at all the problem-solving around it. [I thought] that will be a plastic valve. They can't steam a plastic valve, so if there was a reason to have to shut that valve in the winter, they would have difficulty because they can't thaw the ground with the steamers if it's a plastic valve. I didn't know that. (F1)

Her supervisor liked neither the location of the valve nor its design, and she had to rework the design within the boundaries of the problem as a whole. Her initial focus on designing the valve resulted in neglecting to set the problem adequately. Once this was remedied, she was able to select a more satisfactory solution and a better design for that solution. The lesson she learned from this experience was that the design "can always be better if you're thinking of the problem."

Design. None of the engineers in this study thought of their work as primarily design, although those participants who are employed by large organizations told of colleagues whose responsibility was design. Several of those interviewed perceived design as a way of dealing with a discrete facet within the larger task of solving a multifaceted problem. They said, "The actual design process ... is a subset of problem-solving" (M1). As another participant explained, "Sometimes you have to go into the design level before you can finish off the problem-solving stage" (F9). This would be the case if some particular aspect of the preferred solution was troublesome and "some technical issue that needs to be corrected; I would use design in some cases to find the solution to that" (M5). Only when a workable solution has been constructed are the details of the design worked out. At that point, the design "has to be in a form that's usable by the operators on our plant floor to actually fabricate the product, to assemble it correctly, and ship it out to the job site" (M5).

Assessing the outcome. Engineers use a variety of benchmarks to appraise their work. As might be expected, technical performance features of the product (efficiency, longevity) provide assessment criteria for whether the artifact accomplishes the task for which it was designed. As one civil engineer put it, "Once a bridge is in the ground, it's pretty hard to fix things—very expensive. The final test is the test of time. Did it stand up for 50 years? Did it wash away a year later?" (M9).

However, for most of the participating engineers, assessing the outcome of the problem-solving task is not contained wholly within the technical dimension; as with the initial framing of the problem as part of a big picture, judging the worth of the outcome is couched in the social and economic contexts of the specific situation. Thus the response of clients to the solution, together with actual use of the artifact, are as important as the technical performance of the artifact. When client satisfaction is a top priority, as it appeared to be for several of these engineers, user-friendliness is as important as functional efficiency.

Engineers face the task of achieving solutions within the constraints of specific situations. They do not have the luxury of striving for the ideal design.

The personal assessment of making the choices that lead the problem-solver to achieving a solution were summed up as follows: "I think it's more about how you feel about your work, and I think that's the satisfaction that an engineer can feel, that he has done the best that he can do within the cost restraints and the time restraints that he has" (M10).

Summary of Engineers' Views of Problem-Solving

A composite characterization of technological problem-solving from the engineers' perspectives includes the following features:

- Every problem is a new problem by virtue of its particular context;
- The complexity of problems varies, depending on the interactions between the context and nature of the problem space;
- There are different strategies for making choices about paths to follow, such as trial and error, testing, and compartmentalization;
- There is no single solution, but some solutions are better than others;
- Design is framed by the problem as a whole, and is a recursive activity.

We make reference to these features as we turn to an examination of curricular orientations to technological problem-solving, giving particular attention to the new Elementary Science Program of Studies in Alberta (Alberta Education, 1996).

Context for Problem-Solving or Solving Technological Problems?

At each grade level in the Alberta Elementary Science Program, one of the five designated units focuses on the development of problem-solving skills, in contrast to science inquiry skills to be developed in the other units. The topics for the problem-solving activities are specific and relate to one of the science topics being introduced at that particular grade. For example, in grade 2 the topic for the problem-solving-through-technology unit is Buoyancy and Boats and the related science unit is Exploration of Liquids. In grade 6 the problem-solving-through-technology unit is Flight and the science unit is Air and Aerodynamics. At all levels students will be expected to design, construct, and evaluate models related to the designated topic.

The units in the Alberta program labeled *problem-solving through technology* constitute an interpretive dilemma for science educators and classroom teachers with respect to the relationship of technology to the problem-solving. How is *through* technology to be construed? Is the intention to use construction activities (technology) to provide what might be perceived by the curriculum developers to be a pedagogically sound context for the development and practice of generic problem-solving skills? Is the intention to foster development of capabilities in technological problem-solving? Or is the intention to develop awareness of technology as a human activity through engagement in technological processes? Still further interpretations could be made. Clearly the implications for learning and teaching are significantly different depending on which interpretation is adopted. In the following sections, we highlight three issues embedded in the Alberta curriculum (and which have also been debated in the development of school curricula in other jurisdictions):

- The use of technology as a context for generic problem-solving;
- Solving technological problems;
- Technology and science in school curricula.

Technology as a Pedagogical Context for Generic Problem-Solving

The rationale for the Alberta Elementary Science program notes that “Students learn best when they are challenged and actively involved” and “By engaging in the search for answers, solutions and decisions, students have a purpose for learning and an opportunity to develop concepts and skills within a meaningful context” (Alberta Education, 1996, A2). Such statements describe a learner-centered pedagogy that, in the case of the problem-solving units, adopts technology as the context for classroom activities. However, as Millar (1989) pointed out, “active learning approaches are the *means* of engaging pupils’ attention and interest in science lessons, but are not themselves the *ends* or goals of instruction” (p. 58). What, then, are the goals of these problem-solving units?

The stated goal is for students to develop confidence and self-reliance through the development of skills such as planning, decision-making, and self-appraisal. Learner expectations are linked “to two main areas of skill emphasis: science inquiry and problem-solving through technology” (Alberta Education, 1996, A2). Generic skills for both science inquiry and problem-solving are organized in two parallel sequences of Focus, Explore and Investigate, and Reflect and Interpret. The skills of science are identified as “asking questions, proposing ideas, observing, experimenting, and interpreting the evidence that is gathered,” whereas the skills of problem-solving are “identifying what is needed, proposing ways of solving the problem, trying out ideas, and evaluating how things work” (Alberta Education, 1996, A3). There are at least two difficulties with this rationalization. Can we assume that each process (science inquiry and problem-solving) is identifiable by a set of generic skills and a series of procedures? And, if this is the case, can it be assumed that the process can be used many times in many contexts?

The myth of the scientific method has been dispelled to varying extents in different sectors of the community and is no longer presented as ritual in science classrooms. Similarly, there does not appear to be a consistent series of generic procedures that characterize successful problem-solving. But the legacy of process approaches to learning persists despite contemporary debate about the situated nature of learning (Brown, Collins, & Duguid, 1989). The expertise required to solve one type of problem does not necessarily transfer to another problem. Hodson (1996) pointed out that the “transferability [of skill] depends on familiarity with the relevant concepts, and so a demonstrated capacity to perform a skill in a particular context is no guarantee of skill in a conceptually different context” (p. 126).

Engineers in this study noted that every problem is a new one, and choosing a solution entails activity oriented to both the immediate situation and to the broader context. Therefore, it would seem that an interpretation of problem-solving through technology as the provision of an activity-based approach to the learning of generic problem-solving skills would be misguided.

Solving Technological Problems

An alternative interpretation is that the problem-solving-through-technology units are intended to initiate the development of technological capability through an introduction to technological activities, that is, solving problems by

producing artifacts with specific purposes. This interpretation is partly supported by statements of General Learner Expectations oriented to the making of objects for specific functions; for example, in grade 2 students will be able to “construct, with guidance, an object that will satisfy a given purpose” (Alberta Education, 1996, B6), in grade 4 students will be able to “make a structure or mechanical device that achieves a given purpose” (B17), and in grade 6 students will be able to “construct devices that move through the air, and identify adaptations for controlling flight” (B31). The emphasis here seems to be on building devices and models to fulfill specified criteria.

As we see from the perceptions of engineers presented above, their problem-solving activities focus primarily on setting the problem and making decisions in order to generate a path to follow. This entails a complex iterative process of balancing the contribution of many factors to the problem situation—social, economic, and political, as well as the technical. The problems that confront the students are not so much the setting of the problem and making choices, but rather those of planning and making a product in the context of the classroom. In most cases the teacher will set the problem and make available appropriate materials. The back-and-forth thinking required to fit the problem in its space may be reduced to a more linear process of preparing a plan for construction. We have seen that the engineers in this study had differing strategies such as segmenting the problem or compartmentalizing it. Strategies for technological problem-solving are seldom algorithmic except in the case of routine situations. Most students will be relatively inexperienced in technological problem-solving, and there will be potential for them to draw on heuristic procedures, relying on experience, informed trial and error, and feedback. If they come to rely on specific routines for the processes of planning and making in the classroom, this may give the impression of appearing “to tidy up a very messy business” (Johnsey, 1995), which does not reflect reality.

The engineers in this study emphasized the interactive relations of knowing about the problem and choosing a solution path. It is apparent from their descriptions that these interactions contributed to the development of what might be referred to as technological knowledge, a way of knowing a problem such that conceptual understanding and technical skill are interactive. In his study of aeronautical engineering, Vincenti (1993) concluded that “Knowledge itself forms the primary focus; [that] while requirements from design must be kept in mind at all times as determining that knowledge, details of how the process takes place are secondary” (p. 7). The dimensions of that conceptual knowledge are determined “by the tension between the demands of functional design and the specific constraints of its ambience” (Staudenmaier, 1985, p. 104). Technological capability may be characterized as a convergence of cognitive content and experiential understanding derived from what may be thought of as “knowledge of accumulated practice” (Custer, 1995).

In the classroom too, solving technological problems relies on the development of conceptual understanding as well as on the development of technical skills and knowledge of problem-solving strategies; doing cannot be separated from knowing, and perhaps “no amount of procedural knowledge will help when there is a lack of conceptual knowledge” (McCormick, Murphy, & Hennessey, 1994, p. 24). However, the Alberta program offers minimal guidance

with respect to identification of concepts needed for the development of technological knowledge, suggesting that such knowledge is not in itself a goal for the program.

Technology and Science in School Curricula

At least three broad approaches have been used to introduce technology education in schools: technology across the curriculum, as a discrete subject, or with science (Layton, 1993). The first approach rests on the argument that the many dimensions (technical, historical, social, environmental) of technology cannot be adequately addressed if constrained within a single subject in the school curriculum. If technology education is incorporated into all subject areas, then a variety of emphases (technological literacy, technological awareness, technological capability, and technical handling of information) can be developed. In Australia and the United Kingdom, technology is taught as a discrete subject from K-12. The UK National Curriculum (Department for Education, 1995) identifies two components for instruction (design and technology, D&T, and information technology, IT). The intent is for students to develop a design and technology capability, defined as being able to “recognize and explore people’s needs and wants, develop ideas about how these might be met and develop products that meet those needs” (School Curriculum and Assessment Authority, 1995, p. 4). Three essential types of activities are suggested for developing design and technology capability: designing-and-making assignments; focused practical tasks; and investigating, disassembling, and evaluating simple products.

Linking technology with science in educational settings has been a longstanding tradition. Physical science curricula prior to the reforms of the 1960s invariably included examples of industrial applications of scientific principles. In part such practice contributed to the widely held belief that technology is applied science; that is, that knowledge of laws and concepts derived from scientific investigations are prerequisite to the inventions and artifacts produced to improve people’s lives. In the last two decades other ways of linking technology with science have developed in school programs, notably those that place the relationship in socioeconomic and environmental perspectives. These perspectives, often referred to as Science, Technology, and Society [STS], set out to analyze the ways in which science and technology affect social practices, as well as the ways in which social practices and expectations shape science and technology.

The introduction of technology into the Alberta Program of Studies for elementary schools links technology with science by its inclusion in the science program. The rationale is stated as a need for “the decisions and actions of future citizens” to be based on “an awareness and understanding of their world, and on the ability to ask questions, seek answers, define problems and find solutions” (Alberta Education, 1996, A1). No explicit relationship between the processes of science inquiry and problem-solving through technology is spelled out in the Program of Studies, although a common pattern of activities is implied in the parallel sequences (Focus, Explore and Investigate, and Reflect and Interpret) set out in the Program. Differing outcomes are expected for science inquiry (leading to knowledge) and problem-solving (a product or

process that one can use). In several places a view of technology as applied science is implied. For example, in grade 5 students are expected to “*apply* their knowledge of electricity by building electrical devices for a variety of purposes” (B25), and in grade 6 that students will “*apply* their knowledge of aerodynamics to designing, building and testing a variety of flying devices” (B31). These statements point to the understanding of scientific principles as being prerequisite to successful technological problem-solving.

The engineers who participated in this study agreed that science and technological problem-solving were related, and several described technological problem-solving as applied science. However, such labeling was generally qualified by statements suggesting that the use of science was not a straightforward insertion of scientific knowledge into the problem-solving activity. “You have to be selective in what you use, the knowledge that you have and what you can actually use” (M10). The science gets changed so that “It is science but it’s not science” (F3). Although science is used “as a tool to solve problems, to make designs” (M5), decisions must be made as solution paths are constructed, so “You choose; you have that creative aspect” (F5). Historical studies also show that when engineers make use of scientific principles, they first reconstruct it to serve the specific needs of the problem situation (Layton 1993; Staudenmaier, 1985; Vincenti, 1993). Certainly, as the engineers in this study indicated, when technical decisions have to be made about the choice of problem parameters and the behavior of material resources, selected aspects of science are modified and restructured to serve specific purposes.

A view of technology as merely the application of scientific knowledge not only implies a sequence of first knowing the science and then doing the technology, but it also denies technology its own knowledge structure. The brief discussion of the nature of technological knowledge above suggests that knowledge of accumulated practice is far more than placing scientific principles into a problem-solving situation. We would argue that placing technological problem-solving units into a science curriculum is likely to entrench the sequence of knowing followed by doing, as well as diminish the status of technological practice.

Conclusion

We argue that the model of problem-solving through technology in the Alberta Elementary Science program bears little resemblance to the ways in which engineers characterize their work. Engineers emphasize the importance of context in decision-making, whereas the school program suggests a sequence to be used in all contexts. The social, economic, political, and technical features that make every problem unique for engineers cannot be simulated readily in a classroom setting. Classroom problems are generally tasks structured by the teacher rather than by students responding to a compelling need; and the problems confronting the students are technical adjustments required in the making of a model. Strategies of trial and error are more likely to govern students’ actions than the balancing of impinging factors and subsequent making of choices. Engineers speak of a complex interplay between conceptual knowledge and technical skills giving rise to technical understanding, whereas

the school program emphasizes development of generic problem-solving skills rather than concept or technical skill development.

Although classroom technological problem-solving is clearly different from industrial problem-solving, such activities do have the potential to contribute an accumulation of practice (much valued by engineers) that draws on conceptual and technical understandings. The skills and procedures identified in curricular frameworks as learning outcomes could be viewed as tools for technological practice. Classroom problem-solving through technology could be regarded as an opportunity for students to learn how to employ a variety of procedures and strategies in tasks requiring designing and making. As students refine their expertise in specific skills and gain confidence in their ability to achieve solutions to problems, they begin to acquire experience of the manipulative and cognitive exchanges required in making choices about ways to proceed. The engineers in this study pointed out how their previous experiences of dealing with problems affected the strategies they were likely to adopt. If classroom technological problem-solving offers opportunities for students to practice specific skills and encounter a variety of strategies (in a variety of contexts) that contribute to an experiential basis for making judgments, the potential for developing a holistic approach to problem-solving is not necessarily negated. But if such skills and strategies function as the goals rather than the means of learning, and if the focus falls on the *product* of the making activity rather than on the exchange of ideas contributing to the development of technological understanding, then the potential for critical thinking resulting from these activities will surely be restricted.

Insertion of technological problem-solving into a science program is likely to sustain misconceptions about the nature of technological practice and its relations to science. Although engineers may call their problem-solving activities applied science, most qualify this as creative and purposeful use of knowledge selected and shaped for its potential contribution to a problem defined by its context. In a school program the need to reconstruct science knowledge within the confines of a specific problem may not be recognized.

The interpretive dilemma posed by the problem-solving-through-technology innovation is unlikely to be readily resolved. The questions that arise from it are, we suggest, a useful contribution to curriculum development.

Note

1. The engineers were asked to describe their strategies and actions in the context of a current project in their work. They were also asked about their use of science knowledge, their preparation for an engineering career, and how to learn to solve problems. The length of the semistructured interviews ranged from 40 minutes to 90 minutes. Audiotapes of the interviews were transcribed and the transcripts analyzed by identification and characterization of themes that emerged from repeated readings. A summary of these findings was presented in a paper to the 8th Symposium of the International Organization for Science and Technology Education held in Edmonton, August 1996.

The professional engineers are employed by a range of agencies (private or public, small or large) and work in diverse fields of chemical, civil, electrical, environmental, and mechanical engineering. Their training and experience are varied; almost half of the participants have completed master's degrees in their area of specialization (5 males, 4 females), and most have more than five years of professional experience (8 females, 6 males). Several participants hold managerial positions in their organization (5 females, 3 males).

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Enhancing the Validity of Portfolio Assessment in Preservice Teacher Education

Portfolio assessment offers significant opportunities to value teacher reflection and promote good assessment practice in a preservice teacher education program. The primary issue in the use of any assessment task is the validity of the claims that can be made about student performance after this type of assessment has been used. This article sets out both theoretical and practical considerations that should guide the use of portfolio assessment to ensure the highest possible levels of validity. The article concludes with a set of practical validation focus questions and a discussion of specific comments taken from students' portfolios.

Dans le cadre d'un programme de formation à l'enseignement, l'évaluation du dossier de l'étudiant ou de l'étudiante offre des possibilités significatives d'apprécier le raisonnement de l'enseignant ou de l'enseignante en formation et de favoriser une bonne pratique évaluative. La question principale qui ressort de n'importe quel moyen d'évaluation consiste à valider les affirmations que l'on peut faire au sujet de la performance des étudiants ou des étudiantes suite à l'utilisation de ce type d'évaluation. Cet exposé présente les considérations théoriques et pratiques dont on doit tenir compte dans l'évaluation d'un dossier d'étudiant ou d'étudiante pour s'assurer d'une validation du plus haut degré. En conclusion, l'exposé met en relief une série de questions et une discussion des commentaires spécifiques provenant des dossiers des étudiants et des étudiantes.

Introduction and Overview

This article is about the use of portfolio assessment in preservice teacher education, specifically in elementary science methods courses. The students' assigned goal in developing the portfolio is to "demonstrate growth as a teacher of science." Having used this mode of assessment over four years in two Canadian universities (University of Victoria and Lakehead University), my focus here is to develop an ongoing evaluation of the validity of this use of portfolio assessment and to propose procedures that will enhance the desired qualities of this form of assessment.

I begin with an examination of the current concepts of validity as enunciated by Messick (1989, 1994), and expanded by Linn, Baker, and Dunbar (1991), Moss (1992, 1994), and Shepard (1993). I then describe the context in which I have used portfolio assessment and analyze the consequences of the significant decisions that were made throughout the year. The article concludes with reflections on the use of portfolio assessment and proposals for future courses.

Validity

The technical issue of validity is acknowledged by measurement theorists (Feldt & Brennan, 1989; Linn et al., 1991) to be the primary consideration in an

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examination of the use of any mode of assessment. The perspectives articulated by Messick (1989) are most persuasive in the current developments of validity theory. Messick defines validity as "An integrated evaluative judgment of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of inferences and actions based on test scores or other modes of assessment" (p. 13).

The significance of this integrated view of validity is its augmentation to include an examination of the consequences of testing; Messick (1989) calls this the "functional worth" (p. 18). Moss (1992) argues that this expansion of validity, particularly in the inclusion of consequential aspects, provides some theoretical support for the use of performance assessment. The problem that Moss identifies is to find "the appropriate set of criteria and standards to simultaneously support the validity of an assessment-based interpretation and the validity of its impact on the educational system" (p. 230). Linn et al. (1991) propose a general set of criteria for the validation of performance assessments. These are useful in framing a validation inquiry but lack the directness of Shepard's (1993) fundamental validity question: "What does the testing practice claim to do?" (p. 429). This question, together with Shepard's two other important questions, "How well does the testing practice do what it claims to do?" and "What does the testing practice do beyond that which is claimed?" set the framework for this article. Questions of functional worth of any major assignment are necessarily a matter of concern to students. Recognition of this consideration and design of the portfolio procedures to take account of such interest are vital to enhance the positive consequences of an assessment.

The goal of the portfolios in this study was for the students to provide evidence showing growth as a teacher of science. Such inferential elements in the structure of the portfolio appear to require similarly inferential scoring dimensions (Koretz, Stecher, Klein, & McCaffery, 1994). I argue that the most appropriate way to develop these scoring dimensions is to use student-developed and instructor-moderated grading criteria. In applying such criteria to grade the portfolios, the instructor is effectively evaluating a major part of the validity of the portfolio. The instructor must then make his or her own inferences about student growth, which might be subjected to further validation.

Context and Purposes for Portfolio Assessment

The elementary preservice teacher education programs at both the University of Victoria and Lakehead University cater to both 4th-year concurrent and one-year BEd students. Methods course classes in science precede a practicum in the fall term, which is followed by more classes and a further practicum in the winter term. Contact between instructor and students extends from early in September to March and provides sufficient time and structured experiences to permit the use of portfolios. As evidence that I valued the portfolio assignment, it was allocated 35% of the marks for the course at each university. (Other assignments included group planning and presentation of a learning center [25%], a review of a nonprint resource [20%], and written reports of observation and practicum experiences in science [10% each].) I prepared a short guide for students about developing one's own portfolio drawing heavily on the work of Collins (1992). In my portfolio guide (Appendix A) I discussed dif-

ferent types of evidence—artifacts, reproductions, attestations and productions—particularly emphasizing the importance of using captions to describe each document in the portfolio indicating why it was chosen as evidence, and of what it is evidence. I also wanted the students to be selective in their choice of evidence:

Your ability to select and interpret evidence of your own growth is a vital part of this project. The question that you must ask yourself about each document is, "What does it add if it is included?" When the answer is "nothing" then the document is not added to the portfolio. However this does not mean that the development of your portfolio is complete as other later evidence should be subjected to the same question. (Author, after Collins, 1992, p. 458)

My rationale for this portfolio assignment was presented to each group of students as a topic for in-class discussion at the start of the year. I identified three principal reasons for the use of portfolios:

1. There is a need to improve science experiences of elementary students in Canada (Science Council of Canada, 1984). Only by looking at their own learning experiences in science will these student teachers feel that they are able (and willing) to teach science.
2. These portfolios with their focus on personal growth and iterative reviews of contents are powerful tools in promoting reflection (Schön, 1983, 1987).
3. When these students become teachers, they should expect to use portfolio assessment procedures in their own teaching. Such approaches will be likely to include student portfolios (Barton & Collins, 1997) and their own professional portfolio (Campbell, Cignetti, Melenyzer, Nettles, & Wyman, 1997).

Science in the Elementary Curriculum

In my work as an instructor in preservice elementary science methods courses I have found that many students have started the course with high levels of science anxiety. Most of these student teachers, typically 80-90%, have majors in the language arts or social sciences. In general, their science at university has consisted of a single mandatory course, usually aimed at nonscience majors. Memories of their own elementary school science experiences are minimal and tend to revolve around field trips, science projects, or one or two curriculum topics. Ann-Marie's comments exemplify such disappointing experiences:

During my elementary school years, my science experiences were limited. I do not remember performing any form of investigative "experiments." The one unit that I do remember doing almost each year was the study of the solar system. The presentation of this unit never left an impression on me and to this day I do not know the names of the planets. For many years we would watch a movie on space and complete handouts. During these years, I became disenchanted with the term "science." I believed that science was something that only "older" people did and that you had to be very smart to succeed. (Ann-Marie, 1995)

The low emphasis for science in the elementary curriculum has been well documented. A notable recommendation of the Science Council of Canada (1984) report *Science for Every Student* is that "Science education should be provided for all children in elementary schools in Canada. It is already written policy. Now it must be put into practice" (p. 33). Implementation of the recom-

mendation in schools has been slow or nonexistent. In 1991 a report from the Ministry of Education (Ontario) entitled *Science in Primary and Junior Education: A Report of Progress* contains the statement, "Many respondents felt that teachers are often fearful of science and reluctant to teach it" (p. 17). A similar problem was identified for British Columbia in the *British Columbia Assessment of Science 1991 Provincial Report* (Bateson, Erickson, Gaskell, & Wideen, 1992) with the recommendation that "Schools and school districts should immediately investigate the degree to which science is being taught ...with particular attention to the Primary Program" (p. 81).

These official concerns about the status of science in elementary schools were shared with student teachers in classes early in their courses. I also believe that it is valuable to provide an opportunity for student teachers to focus on the issue in teacher mode during their school-based experiences for observation and practicum. School observation assignments to describe the status of science in over 100 different elementary schools in BC and Ontario showed wide variations in the practice of teaching science. Most frequently student teachers reported that teachers in the schools they had visited were not teaching any science during observation week, but that it would be possible for the student teacher to introduce a science unit during their practicum if they so wished. Discussions after the practicum indicated that the three reports cited above gave appropriate indications of the need for concern about elementary science.

Reflection

Schön's two works *The Reflective Practitioner* (1983) and *Educating the Reflective Practitioner* (1987) are described by Grimmett (1988) as having attracted significant interest in teacher education and have led to extensive reports of the positive value of emphasis on reflective practice at both the preservice and professional levels (Grimmett & Erickson, 1988; LaBoskey, 1994; Tabachnick & Zeichner, 1991). Although definitions of reflective practice abound (LaBoskey, 1994), that given by Grimmett (1988) in which "reflective practice in teacher education is essentially concerned with how educators make sense of the phenomena of experience that puzzle or perplex them" (p. 11) is seen as most useful for this study. Strategies reported in the literature as having had some success in promoting reflective practice have included group or individual interaction (Wood, 1991), practitioner research (LaBoskey, 1994), and journal writing or portfolios (Gore, 1991; Richert, 1991). The intent of the portfolio is for students to learn from their past experiences, particularly reflection or reflection-on-action. It is in this context that Schön (1988) writes of the significance of the need for student teachers to be able to tell a story, "for story-telling is the mode of description most best suited to transformation in new situations of action" (p. 26). My choice of the story of a student's own growth as an emphasis in the portfolio was intended to provide the student teachers with an opportunity to reflect on their own prior experiences in science and to make sense of their new experiences in terms of how they would teach science. For some student teachers, it was important to internalize what it is to reflect:

I feel that reflection is a very positive part of personal growth and I feel that perhaps I do not do it enough. I mostly reflect mentally although I have decided that I will benefit more if I recorded these thoughts. I would then have concrete

evidence to look back on and remember if it is ever necessary. Also, reading back on past reflections presents a whole other possibility. Can you imagine the possibility of reflecting on a reflection? I get confused thinking about it! Anyway, the point that I am trying to make is that now I have finally realized what reflecting can do for me and I feel that I have grown as a person. (Tara, 1993)

Other students' reflections demonstrated a profound analysis of their views of themselves as teachers. Tom's portfolio exemplified such an approach:

I entered university as a very immature mature student (a position I still tenuously hold to) thinking I would be a journalist or writer of some note. In order to provide for myself during the months at university I began working the sidehills of coastal BC harvesting the green gold that forested its slopes. My science was now concerned with line speeds, kick backs, near misses, lines of deflection, root structures, and in several camps of the northwest, I learned at the feet of some of the best educators I have known (paradoxically, many of these men would be considered by society to be among its most uneducated). Much of the instruction was uncomplicated, the behaviors desired were elicited by simple maxims (my particular favorite was and still is: "Run or die chokerman, run or die!"). The summative evaluation was similarly straightforward: the successful completion of a day of study was being able to walk down the hill at the end of it. The point that I seek to make is that the sum of my experiences has created the individual, but it is the individual that creates the teacher. I do not believe that you, or anyone, can develop and instruct a methodology that will create a teacher. My personal belief is that a teacher must first empathize before they can teach and that is something that is innate. I am empathic, but at this time and place my heart does not follow and therefore, I will not teach when I finish this degree as I would be doing more harm than good. You could (and probably will) argue that I am not answering the question set out, but I am simply answering the question the best way I know how. (Tom—Introduction to portfolio, 1993)

This introduction led to a portfolio that insightfully evaluated Tom's experiences, for example, an entry entitled "Missed Opportunities During the Fall Practicum" in which Tom recalls how he might have chosen different activities for his seashore unit. He laments how he had not considered that his passion for kayaking might have enabled him to be more enthusiastic about tidal areas on the coast of British Columbia.

Experience in the Use of Portfolios

Student Portfolios

In recent years there has been increased emphasis on classroom use of portfolios (Barton & Collins, 1997; Gearhart & Herman, 1995), though Herman and Winters (1994) are critical of the lack of research into their use. Studies in the use of portfolios in large-scale assessments have identified difficulties (Koretz et al., 1994) and successes (LeMahieu, Gitomer, & Eresh, 1995). Hebert (1992) reports on classroom-based use of portfolio assessment as leading to "benefits far beyond what any of us could have imagined" (p. 58). Most significant of these advantages were the "new ways of looking at children's learning" (p. 58). Hebert describes the experience of using portfolio assessments in schools as being more valuable than the product. My choice of portfolios in the university context was influenced by the strong emphasis given to this mode of alternative assessment in schools by the Ministries of Education in both BC and Ontario.

Professional Portfolios

In addition to its value in stimulating reflection, the teacher portfolio has been implemented as a component in teacher certification (Lomask, Seroussi, & Budzinski, 1997) in the state of Connecticut. All beginning teachers must produce a portfolio as part of the Beginning Educator Support and Training (BEST) induction program. Lomask et al. recognize that this portfolio assessment can have multiple applications beyond licensure, which include sharing with peers as a basis for staff development and curriculum revision. In addition the portfolio might be used by a teacher who is seeking new professional career opportunities. Although there is an explicit need for student teachers in Connecticut to gain proficiency in the use of the professional portfolio, the lack of immediacy in Canada has led to some student teachers finding difficulty in suspending their disbelief:

Looking back at all of the assignments that I have completed over this school year I think this one is by far the most difficult. I had not heard of this type of thing before your introduction. I found this difficult in an off the wall sort of way. I normally enjoy challenges and tackling things that I have never before encountered. I did not gain a lot of enjoyment out of this portfolio. This is where the difficulty came into play. Although I will be quick to point out the importance of measuring personal levels of growth I have difficulty in seeing the relevance of giving someone who does not know me and my life experiences examples of my growth. I grow daily, there are always new experiences that I encounter. I learn with others, from others, through trial and error, and on my own as well as in hundreds of other ways. The day that I cease to learn will be the day that I die. I am not trying to trash the idea of portfolios, I simply do not believe that everyone will share your enthusiasm for them. I guess that regardless of what the assignment is someone will find it to be less than inspiring. (Susan, 1995)

Susan's critical comments were unique in over 250 portfolios at the two universities but, together with other elements in her portfolio, demonstrated evidence of her thinking about the process and her own growth.

Procedures

Having identified the multiple purposes of the portfolio assignment, I believed it necessary to provide support for the students in their analyses throughout the year. This was done by providing assignments that were valuable in their own right, but also contributed to the underlying structure of the portfolio. The first of these focused assignments was to describe the position of science in their observation week school; the second was to write a reflective piece about their own science experiences in the fall practicum. Each of these assignments provided impetus for an in-class discussion following these school-based experiences. Most student teachers appeared to value the opportunities to discuss their experiences with peers who had visited different schools. These assignments and discussions contributed to the students' ability to evaluate their growth as teachers of science and enabled them to consider possible entries for their portfolios.

Approximately one month before the portfolios were due to be completed, members of each class spent time working in small groups to generate proposed criteria for scoring the portfolio. These were written on overhead sheets and presented to the rest of the class. Using these sets of criteria I

		Portfolio presented on due date.
35		Each item in the portfolio contributes to the value of the portfolio, no redundancy.
		Connections between elements of the portfolio are evaluated and considered in terms
34	A+	of personal importance/experiences. Shows insight.
		Original ideas/experiences described and discussed (in captions).
33		Evidence provided from a broad range of contexts, for example, practicum, field trips,
		classes, nonuniversity experiences, etc.
32		Areas for further development are examined and strategies for this development are
		discussed.
		Outlines strengths and weaknesses.
		Portfolio is organized, an overview is present.
31		Portfolio presented on due date.
		Each item in the portfolio contributes to the value of the portfolio, no redundancy.
30	A	Connections between elements of the portfolio are clearly described (captions?).
		Shows insight.
29		Portfolio contains different types of supporting evidence.
		Material clearly demonstrates personal growth and ability to learn.
28		Areas for further development are examined. Outlines strengths and weaknesses.
		Portfolio is organized, an overview is present.
27		Portfolio presented on due date.
		Portfolio is technically complete with several items. Redundant items are present.
26	B	Captions are inconsistent.
		Minimal evidence of personal growth or ability to learn.
25		Limited insight. Limited evaluation.
		Some evidence of reflection, though narrow in focus.
24		Portfolio is partially organized.
23		Portfolio presented.
		Appears to be "thrown together."
22	C	Portfolio contains few examples. Some questionable choices.
		Cursory descriptions on captions.
21		Evidence provided of a single state, rather than of development.
		Material presented is not organized.
20		Portfolio presented.
19	D	Many questionable choices.
18		Little evidence of long-term thought.
		Material presented is not organized.
17 to 1		Portfolio appears in some form. Not complete.
0		Not handed in at all.

Figure 1. Rating scale for evaluating portfolios.

generated a rating scale that merged the students' expectations with my own. Student teachers each received a copy of this rating scale two weeks before the portfolio was to be handed in for grading. The 1995 rating scale is shown as Figure 1.

Student teacher collaboration in the development of the rating scale has significant advantages to ensure shared understanding in the identification of the attributes of an appropriate portfolio. Specifically it demonstrates concern for the construct validity issue of score meaning by illuminating the theories that guide the construction (for the students) and grading (for the instructor). Many sets of criteria were very similar, with few differences for each university. Much of the rating scale was derived from student criteria, but the valuing

of conciseness in the form of “no redundancy” came from the instructor; it was intended to focus the students on their need to evaluate the contribution of each entry. Students were consistent in their emphasis that the portfolio rating system should value evidence of competence, behaviors that were very much consistent with those outlined by Reynolds (1992) in a review of the characteristics of a competent beginning teacher.

Grading the portfolios took place during the last week of the winter semester. I developed a scoring table from the rating scale and printed a personalized scoring sheet; the scoring table is shown as Figure 2. I found that most portfolios took between 20 and 40 minutes to read, evaluate, and provide written comments, though some took almost twice that. In cases where I perceived that more feedback or discussion was required an interview was arranged. Tom’s portfolio (cited above), in which he indicated his decision not to proceed with a teaching career, exemplifies such an obligation.

Analysis

My analysis is presented in terms of specific considerations that I have found important in my work with student teacher portfolios. I identify the salient features of the consideration and follow with the underlying question that guided this focus. Each question arises from my interpretation of the requirements of current validity theory (Linn et al., 1991; Messick, 1989; Shepard, 1993): the questions are also presented as a checklist in Appendix B.

Portfolio presented on due date.	Yes	No	2 days late	3 days	4 or more
Portfolio is organized.	Yes		Partially		No
An overview or personal philosophy is present.	Clear and coherent	Yes		Not present	
Each item in the portfolio contributes to the value of the portfolio, no redundancy.	No redundancy	Slight redundancy	Moderately redundant	Very redundant	Very repetitive
Growth from a student to a teacher is evident.	Clearly	Mostly	Sufficient	Little	None
Connections between elements of the portfolio are evaluated and considered in terms of personal importance/experiences.	Extensive	Mostly	Some	Few	None
Consideration of personal experiences.	Extensive	Mostly	Some	Few	None
Innovative ideas described and discussed.	Extensive	Mostly	Some	Few	None
Evidence provided from a broad range of contexts, for example, practicum, field trips, classes, etc.	Regularly	Mostly	Sometimes	Few	None
Risks considered, strategies developed, used, and evaluated.	Regularly	Mostly	Sometimes	Few	None
Areas for further development are examined and strategies for this development are discussed.	Regularly	Mostly	Sometimes	Few	None
Outlines strengths and weaknesses.	Extensive				Limited
Shows insight.	Extensive				Limited

Figure 2. Scoring table.

1. *Goal.* The goals of the assignment must be clearly stated by the instructor at the start of the assignment. A goal of describing personal growth was seen by the students as being fair and attainable, Marie (1993) described the process as both “a worthwhile experience” and “enlightening.” Such clarification of the goal takes the portfolio beyond being another assignment and addresses the functional-worth perspective of consequential validity put forward by Messick (1989, 1994) and also Shepard’s (1993) question of purpose. This can be seen in what Harry wrote in his Introduction:

As the portfolio took shape it became obvious that I was about to take the reader on a tour of my life. Through the highs and lows illustrated in these pages it is obvious that much has been learned in respect to science, the socials and exactly who I am as an effective teacher. I feel that each of the components included within has a right to be represented, and also acts as a mirror of who I am and will be in the future as a teacher. I hope that you as the reader enjoy what has been included. Welcome to my life! (Harry, 1995)

Question: Are the purposes for the assessment stated clearly, and in terms that the student teachers can relate to their own experiences?

2. *Outline.* There must be clear guidance to students about the types of materials that can be used in a portfolio. Recommendations about the use of captions was an important part of this outline. Captions are used to explain the meaning of each item in the portfolio, particularly the relevance of the evidence, thus captions contribute toward clarification of student teacher claims and subsequent inferences from the instructor. Ann-Marie’s caption demonstrates how such captions can be used to focus both student and instructor:

This reflection is very important to me. It gave me an opportunity to question my attitude about science at the present. I think it is extremely important to reflect on prior experience you have because they made you what you are today. After writing down each of the negative experiences I have faced with science, I was able to evaluate my feelings and turn myself in the right direction. (Ann-Marie, 1995)

Question: Has the instructor described a mechanism for the student teachers to explain the significance of each portfolio entry?

3. *Number of documents.* It is vital to show students how they can make their portfolio as concise as possible. In the outline I recommended five to seven pieces of evidence as an appropriate number together with consideration of the limiting question, “What does it add if it is included?” Several students, such as Judy (1993), commented that she was “taking more out than I was adding when it came to the final presentation.” Colleagues who did not recommend such limits found their students’ portfolios to be excessively long and demand many hours for grading. Portfolios that cannot be graded in a reasonable time are not practicable.

Questions. Is the portfolio functional? Does it focus upon the salient issues?

4. *Timelines.* There must be sufficient time for the students to think about their own learning. Seven months appears to be sufficient in this setting. Students complained in their science portfolios that other instructors who had introduced portfolio assessment for courses in the second semester, allowing nine weeks for the portfolio, had not structured the assignment to allow sufficient time for reflection or opportunity for school-based experiences.

Question: Do the timelines of the portfolio provide a sufficient duration for student reflection?

5. *Value.* The measure of how an instructor values the work in a specific assignment is measured in the amount of marks allocated; allocation of significant proportion of the marks for the course encouraged the students to share this perspective.

Question: Does the instructor demonstrate that [he or she] values the portfolio assignment by allocating a significant proportion of the course marks to it?

6. *Clarity of grading criteria.* Students were involved in the development of the criteria for the evaluation of the portfolio so that the questions about the grading of the portfolios were resolved easily. Diana (1995) reported in her portfolio that she “did not like doing this” because it “reflects her lack of comfort with assessment and evaluation.” The clear rating scale allowed student teachers to recognize that there were consistent standards for evaluating their evidence.

Question: Are the grading criteria consonant with student teacher understanding of the nature of the portfolio assignment?

7. *Sensitivity and feedback.* The instructor must be aware that many students will explain many of their significant life experiences in the portfolio, for example Mary’s comments raise some of the successes and problems in her family life:

This portfolio is about growth. It is actually about growth as a science teacher. I will get back to that but I have an observation. I do not think it is possible to grow in one area of your life unless you grow in all areas of your life. This includes making sacrifices for things you believe in and want for yourself. There has been nothing in my life that has made me grow more than having a child of my own. From the day I became a mother I became the most important teacher in someone’s world—my daughter’s. Even though I went back to school when she was four month’s old, the sacrifice of that precious time with her was worth the reward of being accepted into teacher’s college. This has been a tough year on all of us—my husband, my daughter and myself. My husband has become even more incredible and more supportive (something I had not thought possible—although we’ve had our moments!). My daughter has become more independent and self-sufficient. I have become more confident and am proud of my accomplishments. I always felt I had to compete with others but now I am satisfied with the effort and performance I put into things. I finally feel complete. I think this shows growth in some way—in maturity, perhaps. (Mary, 1995)

Inclusion of such candid reflections requires a supportive environment not only in class, but also in the grading process. It is incumbent on the instruc-

tor to perceive the need to provide clear and considered responses to all student teachers, and to recognize and respond to the needs of special cases.

Question: Is the instructor able to provide a sensitive environment and supportive feedback?

Voices of the Students

This project was started at the University of Victoria in 1993 and has continued at Lakehead University from 1995 to 1997. The depth of the connections made by the students in their portfolios showed a level of insight that I had not initially expected. I received permission from several student teachers to copy some pages of their portfolio; these are some of their comments:

Tara: Portfolio Entry: I have very few memories of anything science-oriented in elementary school. After conversations with past classmates and trying to dredge up information from my past I was able to determine that science played a very small part in my schooling. When science was taught there was very little hands-on experience and I believe that this is one reason why I have science amnesia.

Joan: Introduction to portfolio: If I have learned anything over the past eight months it would be the importance of being reflective, both as teacher and a learner. I have found the time that I spend thinking and writing about my personal responses to a given situation to be extremely valuable in helping me make sense of the situation, in helping me to look critically at the outcome, and in helping me formulate an even better plan for the next time around.

Bill: Portfolio Entry: At the beginning of the course my knowledge of the influence of gender issues in science was somewhat limited. Due to roles in child psychology I learned that gender roles are often part of the hidden curriculum, but I did not realize to what extent this pervades and influences children's thinking. Different styles and colors of toys is of small import, it is the subtle message that is sent to girls that they should be concerned with things of their own world that is significant. As most history, therefore what is taught as history, is written from a male perspective, women are not portrayed in the educational curriculum. Girls need role models in science and mathematics, and it is the job of the teacher to demonstrate that the science and technical fields are not the male bastions that they are often portrayed as. Our role is to educate not segregate and by limiting girls to stereotypic representations we are practicing our own particular brand of educational isolationism.

Kim: Portfolio Entry: I began a unit on spiders with my sponsor teacher. I must admit that spiders have got to be one creature that I like the least. Every time one startles me I think I jump about one hundred feet and scream. I concluded that this was not appropriate behavior to exhibit in front of the children. I confronted myself with my fear of spiders and decided that I must contain my overreaction to these harmless creatures. So, without saying, the children were daily bringing in these spiders that they had found out on the playground, or spiders they had captured from home. I felt the goose bumps all over my body, but still

maintained my composure. A girl brought me one of those spiders with the big round body. I took a big breath and exclaimed, "Oh neat! Can you see the separate body parts?" The girls took a closer look, "Oh yeah." Then she went off to show others her discovery.

By reacting the way I did, I had done three things. First of all, I modeled an appropriate behavior for the others to follow, I demonstrated and interest in the spider, and finally, I have cleared myself so that the boys do not start putting spiders in my desk, shoes, etc.

Concluding Comments

The three principal reasons for the use of portfolio assessment in preservice teacher education are seen to provide ample justification for the use of this mode of assessment. Students develop their own understanding of the state of the elementary science curriculum in their province. There are structured opportunities for, and valuing of, student reflection. Finally, students gain experience in the use of a mode of assessment that is growing in importance in North America for student and teacher evaluation (Dana, Tippens, & Kamen, 1994; Naizer, 1994; Settlage, 1996).

Efforts to enhance the validity of portfolio assessment must focus on examining both the intent and the consequences of the assessment enterprise. In addition, the instructor must develop strategies that enable each student teacher to clarify her or his own design for each piece of evidence. Such clarification would enable the instructor to be more certain about the claims that can be made about student performance. The questions for validation posed in this article provide some direction for others who may wish to use portfolio procedures in their own methods classes.

Although many student teachers made the claim that this project had increased their enthusiasm for teaching science in the elementary school, it is not possible to follow up on this assertion as few of these teachers gained full-time teaching positions. As an instructor I found the feedback much more valuable than I had anticipated, and reading the portfolios was especially illuminating. There was persuasive evidence that many students had taken this opportunity to think about their growth as teachers and appreciated the opportunities to document this growth. I consider such feedback as evidence of the functional worth of this mode of assessment in the specific context of preservice science methods courses and intend to continue my use of portfolio assessment. However, I shall be guided by my examination of evidence in response to each of the validation questions. Should I find evidence that I am not succeeding in producing a positive response to even one of these questions, then it is time to revise procedures or even move to a new form of assessment. Such are the requirements of validation.

Note

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Appendix A

Portfolios

The portfolio should contain enough materials to provide evidence of your growth as a teacher who can bring science into the primary (or junior) classroom.

There are many types of evidence that can be included in your portfolio, though these can usually be grouped into four distinct classes:

Artifacts: documents produced in the normal course of your work. Could include class notes, a paper, field notes from the practicum, lesson plans, children's work or a videotape of you teaching.

Reproductions: documents about typical events in your work, but which are not usually captured, for example, a photograph of a chalkboard or a bulletin board display, or tape of a discussion with a faculty or school advisor.

Attestations: documents about your work that have been prepared by someone else. Such documents might be a report of a lesson written by your school or faculty advisor, or a letter of thanks for extra curricular activities from students or parents.

Productions: documents prepared especially for the portfolio. These include a goal statement, personal reflections, or captions.

You might use a *goal statement* to describe the evidence that you believe that you can use to show your growth and how you intend to collect it.

Personal reflections can be written as you are proceeding through the course, looking back on what has happened and considering how your experience will change what you plan to do. You might reflect at the end of the course about your own growth and how these documents portray this growth.

Captions are the statements that you will attach to each document in the portfolio. Captions are important because they describe what the document in the portfolio is about, why you have chosen it as evidence, and what it is evidence of. When you write a caption you examine how that document contributes to what you have learned and how you have applied this knowledge.

As the person who will assign a grade to your portfolio, I expect to use the documents and their captions to interpret the evidence in the portfolio. Captions do not need to be very long, you may use post-it sheets. I believe that captions are a vital part of the portfolio. I have also found that when reports of lessons are contained within a portfolio, the inclusion of your own lesson plan and comments about the lesson add to the validity of the portfolio.

How much evidence?

There is a delicate balance about how much you should put into your portfolio. A large number of documents will ensure a complete record of your growth, in much the same way as hourly photographs do of a tree's growth over the course of many years. Your ability to select and interpret evidence of your own growth is a vital part of this project. The question that you must ask yourself

about each document is, “What does it add if it is included?” When the answer is “nothing” then the document is not added to the portfolio. However this does not mean that the development of your portfolio is complete as other later evidence should be subjected to the same question. Instructors who have used portfolios in teacher education elsewhere have found that between five and seven documents appear to work for their students. I shall not set a rigid limit, but you should take these numbers into account in deciding what evidence to submit.

Scoring

This assignment will be worth 35 points.

I believe that it is important to value the complexity of the achievements that will be described in the portfolios. Early in February, 199x we shall work together in the development of criteria that I shall use for judgement of your portfolio and you will receive detailed descriptions for each grade level.

N.B. Much of this approach to portfolio assessment was taken from the ideas presented in *Portfolios for Science Education: Issues in Purpose, Structure, and Authenticity* by Angelo Collins in the July 1992 edition of the journal *Science Education*.

Appendix B

Portfolio Assessment: Validation Questions

- | | |
|-------------|--|
| Question 1. | Are the purposes for the assessment stated clearly, and in terms that the student-teachers can relate to their own experiences? |
| Question 2. | Has the instructor described a mechanism for the student-teachers to explain the significance of each portfolio entry? |
| Question 3. | Is the portfolio functional? Does it focus upon the salient issues? |
| Question 4. | Do the timelines of the portfolio provide a sufficient duration for student reflection? |
| Question 5. | Does the instructor demonstrate that [he or she] values the portfolio assignment by allocating a significant proportion of the course marks to it? |
| Question 6. | Are the grading criteria consonant with student-teacher understanding of the nature of the portfolio assignment? |
| Question 7. | Is the instructor able to provide a sensitive environment and supportive feedback? |

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Scaffolding of Metacognition in Intervention Lessons

The purpose of this study was to investigate the scaffolding used by teachers to foster development of metacognition in young children in a reading intervention program. Tapes of intervention lessons were analyzed, and instances of metacognition and scaffolding were identified and categorized. Children produced more self-corrections than metacognitive comments about reading and writing tasks and strategies. They also produced more metacognitive responses during reading than other types of activities and on easier than more difficult books. The most frequent category of scaffolding was coaching, which frequently preceded children's self-corrections and served to reinforce correct responses.

Cette étude avait pour but d'examiner le genre d'échafaudage utilisé par les enseignants et les enseignantes pour promouvoir le développement de la métacognition chez les jeunes enfants dans un programme d'intervention en lecture. On analysa des leçons d'intervention en lecture sur cassettes, on identifia et on catégorisa les cas de métacognition et d'échafaudage. Les élèves produisirent plus de cas d'autocorrections que de commentaires métacognitifs à propos des tâches et des stratégies de lecture et d'écriture. Aussi, ils ont offert plus de réponses métacognitives au cours de la lecture qu'au cours d'autres types d'activités et par rapport à des livres plus faciles que difficiles. La catégorie la plus fréquente d'échafaudage fut celle de l'intervention pédagogique qui précédait fréquemment les cas d'autocorrections par les élèves-mêmes et qui servait à stimuler l'élève à produire la bonne réponse.

Increasingly, educators are viewing literacy from a social constructivist perspective (Hiebert, 1991; Hiebert & Rafael, 1996). Rather than assuming that meaning resides in the text, meaning is created through interaction of the reader and text, and readers are active participants in the creation of meaning

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and their own knowledge. The teacher's role from this perspective involves building students' background knowledge and teaching reading strategies (Dixon-Krauss, 1996).

Short (1991) indicates that two assumptions underlie the notion of teaching for strategies. First, readers need to develop a wide variety of cognitive strategies they can choose from when they encounter reading difficulty. Second, becoming a strategic reader involves some degree of reflection or awareness of these strategies, particularly when a student is learning to use new strategies or techniques. Hence teachers need to be concerned with development of both cognitive and metacognitive strategies.

According to Forrest-Pressley and Waller (1984), "Cognition refers to the actual processes and strategies that are used by the reader" whereas "metacognition is a construct that refers, first, to what a person knows about his or her cognitions and second, to the ability to control these cognitions" (p. 6). Paris and his colleagues (Jacobs & Paris, 1987; Cross & Paris, 1988) have delineated two broad categories of metacognition: self-appraisal and self-management. Self-appraisal includes an understanding of *what* factors affect reading, *how* reading strategies operate, and *why* and *when* to use strategies. Self-management includes planning, evaluation, and monitoring.

Researchers have generally found that young children are less likely than older children to display metacognitive awareness or control (Brown, 1980; Flavell, 1979). From reviews of the literature on children's awareness of the process of reading, Yaden (1984) and Paris, Wasik, and Turner (1991) concluded that young children have only a rudimentary understanding of the task of reading and that their understanding and control of strategies increases with age.

In a previous research project (Juliebö, Malicky, & Norman, in press), we investigated both the spontaneous and researcher-prompted metacognition displayed by young children during their involvement in an early intervention program. The children produced a wide range of metacognitive responses, but they produced far fewer during the intervention lessons than when provided with probes from a research assistant as they watched videotapes of their lessons. When asked about specific behaviors, the children were able to do more metacognitive processing than was apparent during the intervention sessions. It was not clear from that study, however, what the teacher's role was in development of metacognitive awareness and control.

In their review of research on metacognition, Baker and Brown (1984) identified interactions between teachers and students as being critical to development of metacognition. Several constructivist educators have drawn on the work of Vygotsky (1962, 1978) to explicate the social dimensions of literacy learning (Clay & Cazden, 1992; Dixon-Krauss, 1996). According to Vygotsky (Hiebert & Rafael, 1996),

learning occurs first on the social plane where, through interactions with more knowledgeable others, learners come to understand new concepts and strategies. Individuals eventually use and extend these concepts and strategies to other contexts, but meanings and interpretations have been initiated in social interaction rather than in solitary action. (p. 560)

In other words, learning occurs from the social (speech) to the internal (thought), (Vygotsky, 1978). According to Dixon-Krauss (1996), "Vygotsky's concept of internalization is the progressive transfer from external social activity mediated by signs to internal control" (p. 10). Teacher talk clearly falls into the social plane; the question is how to help children move from this to internal understanding and control.

In Vygotsky's theory, self-talk or egocentric speech plays an important role in linking speech and internal thought. Hence it would appear that having children engage in talk about their literacy learning will facilitate development of internal thought about and control of that learning. This is the position of Englert and Mariage (1996), who indicate that "the public conversations in which students participate become internalized and transformed as inner thought to guide and regulate performance" (p. 157). By employing a framework that apprentices students in the "ways-of-talking" in a literate community, students learn "ways-of-thinking" or mental processes that lead to greater self-agency and proficiency. Englert and Mariage (1996) believe that by modeling, thinking aloud, questioning, prompting, and weaving ideas, teachers can make mental processes visible and accessible.

For teachers to maximize a child's learning, they need to provide instruction in the child's "zone of proximal development" (Vygotsky, 1978, p. 86). This is the distance between the thinking that a learner can do independently and the thinking that the learner is capable of doing with the support of an adult or a more capable peer. Scaffolding between what children know independently and what they can do with assistance constitutes teaching in their zone of proximal development.

Scaffolding is a metaphor introduced by Bruner (Wood, Bruner, & Ross, 1976) to refer to "A process that enables a child or novice to solve a problem, carry out a task, or achieve a goal which would be beyond his [or her] unassisted efforts" (p. 90). Wood et al. characterize a scaffold as a temporary and adjustable structure that allows students to accomplish a task that would otherwise be beyond their capability. Pressley, Hogan, Wharton-McDonald, and Mistretta (1996) indicate that scaffolding provides students with assistance on an as-needed basis, with instructional support reduced as students internalize problem-solving processes.

Some educators have used the term *scaffolding* to refer to a range of teacher-student interactions (Anderson, 1989; Gaffney & Anderson, 1991; Wong et al., 1994), whereas others distinguish scaffolding from other types of interactions (Cazden, 1992; Juel, 1996). Juel (1996), for example, defined a scaffolded experience as "one in which the tutor enabled the child to complete a task that the child couldn't otherwise do (e.g., read or spell a word) by providing a piece of information and/or segmenting the task into smaller, clearer ones" (p. 283). She defined modeling as "walking the child through a process—showing the child how reading and writing work so that the processes are clearer, more accessible and less mysterious" (p. 286). Juel differentiated both scaffolding and modeling from direct instruction. For the purposes of this study, scaffolding is a term used to refer to a range of interactional supports that are structured by adults to maximize the learning of at-risk children.

One program designed to help at-risk children learn to read is Reading Recovery™ (Clay, 1993b). Originally introduced in New Zealand, this program is now widespread across North America and Australia as well. The purpose of this early, intensive instruction is to help young children experiencing difficulty with learning to read to catch up with their peers and not require further remedial assistance later in their school programs. Considerable evidence indicates that early intervention programs do help young children catch up with their peers (Pinnell & Hovest, 1996; Pinnell, Lyons, DeFord, Bryk, & Seltzer, 1994; Shanahan & Barr, 1995; Wasik & Slavin, 1993).

A major purpose of Reading Recovery is the development of a “self-extending system” that in turn fosters independence and continued reading progress after children have been discontinued from the program (Clay, 1993b; Clay & Cazden, 1992; Gaffney & Anderson, 1991; Short, 1991). Studies are beginning to examine the nature of teacher-child interactions that contributes to development of this self-extending system (Pinnell & Hovest, 1996).

Askew (1993) analyzed tapes of interactions between children and teachers across four readings of the same text. Results revealed that children’s monitoring, error detection, and self-correction increased and teacher intervention decreased as texts became more familiar. Wong et al. (1994) also examined the nature of teacher behaviors as a function of text familiarity. They identified five types of scaffolding comments: (a) telling, which provides a word or explanation; (b) modeling, which explicitly demonstrates an act; (c) prompting, which focuses attention on visual, structural, or meaning cues available in the text; (d) coaching, which directs the lesson or focuses on the student’s performance or response; and (e) discussing, which is talk about the text that focuses on meaning. They found that when students reread familiar texts, teachers became less directive and moved to coaching comments. However, when they read new texts, teachers increased their modeling, prompting, and discussing comments. A case study by Dorn (1994, cited in Pinnell & Hovest, 1996) focused on the nature of child and teacher talk in Reading Recovery lessons. Results revealed “transitions from teacher-regulation to child-regulation in literacy events.” In other words, it appears that the children in Dorn’s study gained increased metacognitive control of their reading strategies across the intervention program.

The purpose of the research reported in this article was to investigate the scaffolding used by teachers to encourage the development of metacognition in young at-risk readers in a reading intervention program. The program emphasized the importance of young readers developing a self-improving system through metacognitive awareness, but more research is needed to determine how teachers scaffold metacognitive experiences for young children. Teacher-child interactions during reading intervention lessons were analyzed to determine the following:

1. what types of activities in reading intervention lessons were linked to children’s metacognitive behavior;
2. what types of teachers’ scaffolding behavior were evident in intervention lessons; and
3. what teacher behaviors were linked to children’s metacognitive behavior.

Method

Participants

Four teachers from one reading intervention program in a county school system serving both urban and rural areas volunteered to take part in the study. Permission was obtained for the five children they were working with to participate as well. The teachers had been teaching for 15-29 years and so had considerable teaching experience before their involvement in the reading intervention program. All teachers were in their second year of implementing reading intervention at the time of the study.

The children, four boys and one girl, were in grade 1 and had been identified by their grade 1 teachers at the end of their first term in school as experiencing difficulty in learning to read. This was confirmed by results of informal literacy tests (Clay, 1993a) administered in January, which revealed that all were at an emergent stage of literacy development. At that time the children ranged in chronological age from 6 years 3 months to 7 years 1 month, with an average age of 6 years 10 months.

The Reading Intervention Program

The children were involved in one-to-one tutoring on a daily basis for 30 minutes per session. The teachers began with two weeks of "roaming around the known" (Clay, 1993b, p. 12) and then continued for 14-16 weeks of instruction. During each session children read several books (ranging from familiar to new), produced a short composition, cut up and reassembled the composition, and practiced letters (if needed) and words. Specific techniques outlined in Clay (1993b) were employed in relation to children's needs as identified by the teachers. Familiar books were sent home with the children for further practice.

The teachers were involved in an inservice program during their first year in the reading intervention program. All inservice sessions were conducted by Moira Juliebö, one of the investigators. Sessions focused on administration and interpretation of results on the informal diagnostic tests as well as instructional techniques outlined in Clay (1993b). Meetings were scheduled bimonthly throughout the school year.

Procedures

As part of the inservice component of the intervention program, the teachers in the study made videotapes of their intervention sessions to be critiqued by the group. In the previous study, two videotapes recorded by each teacher near the middle to end of the 14-16-week intervention program were analyzed to determine instances of spontaneous metacognitive behavior by the children. In the current study, the same tapes were reanalyzed to determine the segments of the lessons most likely to produce metacognitive behavior, the scaffolding used by teachers, and the nature of the teacher-student interaction that fostered overt metacognitive behavior.

Two broad categories were used to analyze children's metacognitive responses: knowledge and self-management. These categories were based on both the literature on metacognition and an examination of the metacognitive responses produced by the children in this study (Juliebö et al., in press). The knowledge category included awareness and knowledge about person, task, and strategy factors that affect the progress and outcome of cognitive opera-

tions (Flavell, 1979). Conditional knowledge was also included in this category (Cross & Paris, 1988; Jacobs & Paris, 1987). The person factor included children's knowledge about their reading ability, the task factor their knowledge about the difficulty and familiarity of various reading and writing tasks, and the strategy factor their knowledge about how to use information in the text ranging from visual to context cues. Conditional knowledge involved knowing why and when to use strategies. The self-management category included both evaluation (knowing when and why a response was right or wrong) and regulation (self-correcting) dimensions (Cross & Paris, 1988; Jacobs & Paris, 1987).

The coding scheme developed by Wong et al. (1994) was adapted to analyze teachers' scaffolding in this study because it was more inclusive than most other conceptualizations. However, because Wong et al. (1994) dealt only with the reading portion of the Reading Recovery program (reading familiar and new books), some changes were made to their coding system to include the writing component, the letter-word identification part of the program, and the metacognitive focus of the study. The categories of scaffolding used in this study were defined as follows:

1. *Prompting*. Comments designed to focus the student's attention on the visual, structural, or meaning cues available in the text as well as general prompts during oral reading and writing.
2. *Coaching*. Comments designed to give the reader a perspective by taking him or her outside of the reading act. These comments either direct the lesson or focus on how the student performed or responded in relation to visual, structural, or meaning cues as well as on oral reading and writing activities.
3. *Modeling*. Explicit sharing of the act of reading or writing with the intention of getting the student to employ strategies.
4. *Telling*. Comments made in the reading or writing act that provide the reader with a word, word part or sound, or explanation of a structural element or meaning of a word or picture.
5. *Discussing*. Talk about prior knowledge, text, or strategies occurring during the lesson.

The transcripts of the teacher-student sessions were coded by one of the researchers, and a random sample of these transcripts was selected for coding by another researcher. The interrater agreement was 92%. Frequencies of each category and subcategory were calculated to ascertain what types of scaffolding were used during the intervention lessons.

Results

Incidence of Metacognition in the Intervention Lessons

The intervention lessons typically were made up of five segments: reading a familiar book or books, reading yesterday's book, letter and/or word identification, writing a sentence, and reading a new book. The frequency of metacognitive behaviors in each lesson segment was calculated to determine what activities in reading intervention lessons were linked to children's metacognitive comments. The results of this analysis are presented in Table 1.

Table 1
Instances of Metacognition in Lesson Segments

<i>Lesson Segment/ Metacognitive Category¹</i>	<i>Frequency</i>	
	<i>Number</i>	<i>Percent</i>
<i>Reading Familiar Book(s)</i>		
Knowledge	10	13.8
Self-Management	17	23.6
<i>Reading Yesterday's Book</i>		
Knowledge	5	6.9
Self-Management	22	30.5
<i>Letter/Word Identification</i>		
Knowledge	0	0
Self-Management	0	0
<i>Writing a Sentence</i>		
Knowledge	3	4.3
Self-Management	0	0
<i>Reading the New Book</i>		
Knowledge	2	2.8
Self-Management	13	18.1
Totals	72	100

¹The knowledge component includes awareness of person, task, and strategy variables; self-management includes awareness of correctness of responses as well as self-corrections.

Nearly all of the children's metacognitive behavior occurred during the reading components of the lessons, with no instances of metacognition evident during the letter/word identification part of the lesson and only a few during the sentence writing portion. The reading of previously seen material (familiar books and yesterday's book) elicited higher percentages of metacognitive behaviors than did the reading of a new book. Even on the new book, metacognitive responses most often occurred when the book was read a second time.

There appears to be a direct link between metacognition and familiarity or difficulty of tasks. Children were more likely to make metacognitive statements when they were reading books with which they had already become familiar and that they were able to read with at least 90% accuracy. On the sentence writing task, children wrote a new sentence each day, and at least some of the words were unfamiliar. Similarly, in the letter/word identification segment the teacher was likely to be moving into new areas of knowledge for the children. Finally, the new book was selected to be near the upper end of the child's zone of proximal development. Overall, results indicated that when children had relative mastery of the material they were more able to think about and control their own reading.

The data in Table 1 also indicate that instances of self-management were more frequent than were instances of awareness or knowledge. The most frequent observable metacognitive event was self-correction, which falls under the self-management category of metacognition. Children made fewer com-

ments about how they were reading on all activities during the lessons, although there were slightly more of these types of comments on the most familiar part of the lesson, rereading familiar books.

Nature of the Teacher Scaffolding

The oral language used by the teachers in the lessons was examined to determine the kind of scaffolding it provided to the children. The five categories used to describe scaffolding were prompting, coaching, modeling, telling, and discussing.

The following example from the sentence writing segment of Jason’s second intervention lesson contains four of the five categories of prompts. He was writing the sentence “Yesterday my dad started painting my room and now I’m sleeping with my baby brother” and had reached the word *now*.

Teacher:	<i>Now,</i>	(Telling-word)
	do you want to try <i>now</i> up here	
	to just practice	(Coaching-procedure).
	(Jason writes <i>naw</i> .)	
	Really good try,	(Coaching-word)
	but it’s like <i>cow</i> and <i>how</i> .	(Discussing-word structure)
	What’s that middle vowel?	(Prompting-Sound)

The incidence of teachers’ scaffolding is shown in Table 2. Clearly all five of the categories of scaffolding were used by all teachers. When it is taken into account that these totals represent two half-hour lessons for each teacher, Ms. Green, who had the lowest total with Child 1, still used an average of 248 scaffolding statements during one half-hour lesson, and Ms. Plum, who had the highest total, used an average of 394.

Coaching was the category used most frequently by teachers, comprising 45.1% of the instances of scaffolding. The two subcategories that occurred most frequently were in the coaching category. The subcategory of Reading/Writing—Correct (e.g., “Good show,” “all right”), which occurred 543 times across the two lessons, involved giving the children immediate feedback that their reading or writing performance was appropriate. As the children were in the program because they had been unsuccessful at learning to read, immediate feedback as to their success was essential, and the lessons were planned so that on average the children were operating within the 90-95% success zone recommended by Clay (1993b).

The second largest subcategory was Coaching—Procedure (e.g., “Read it again,” “go on please”), which occurred 524 times. These types of coaching comments kept the lessons moving. Because of both the limited time in each lesson (30 minutes) and the goal to accelerate children’s progress rapidly, lessons were designed to move the children as efficiently as possible through the program.

Teachers also used prompting relatively frequently (25.9% of scaffolding comments) with two thirds of the prompts focusing children’s attention on words, letters, and word parts as well as use of picture cues. In the telling category the most frequent subcategory involved providing children with a word as they read orally or wrote. In contrast to the heavy focus on words in the prompting and telling categories, comments placed in the discussing cate-

Table 2
Instances of Teachers' Scaffolding

Category	Teachers					Total	Percent
	Ms. Green Child 1	Ms. Green Child 2	Ms. White	Ms. Plum	Mr. Black		
Prompting	118	207	123	169	234	851	25.9
Coaching	198	371	263	398	249	1,479	45.1
Modeling	16	54	21	20	30	141	4.3
Telling	90	80	60	73	107	410	12.5
Discussing	74	70	73	128	55	400	12.2
Total	496	782	540	788	675	3,281	100

gory tended to focus more on meaning-making during both reading and writing.

The least used category of scaffolding was modeling with fewer than 5% of teachers' comments being placed in this category. When teachers did engage in modeling, they tended to read alone or with the child or to demonstrate writing or related activities. Teachers rarely modeled use of strategies.

In general, the scaffolding elements throughout the early intervention lessons ranged widely. Some involved a simple acknowledgment of a correct response or supplying an unknown word, whereas others involved much more complex scaffolding to help the children move from inadequate to adequate knowledge in order to determine the correct response themselves.

Teacher Scaffolding and Metacognition

Each metacognitive response made by children during intervention lessons was located, and the nature of teacher scaffolding (if any) both immediately before and after the response was determined. The results of this analysis are presented in Table 3.

The type of teacher scaffolding that most frequently preceded and followed self-management by children was coaching. Teachers directed children to read orally, children made self-corrections during oral reading, and teachers reinforced the children for their oral reading performance as shown in the following example.

Ms. Green: Read it again, just so I know what you're saying. (Coaching-Procedure)
Child: In the garden, *a I found a ...* snail sliding along a log (Self-correction)
Ms. Green: Good show.

Sometimes, rather than directing children to read orally, teachers told them a word or sound or provided them with a prompt to help them continue reading. Again, this was followed by children reading orally, making self-corrections as they read, and being reinforced for their reading. Prompts or telling children words following self-correctional behavior tended to occur when children had difficulty with another word after they had corrected one. Most of the

Table 3
Scaffolding Preceding and Following Children's Metacognitive Responses

Scaffolding Category	Type of Metacognitive Response			
	Knowledge		Self-management	
	Preceding	Following	Preceding	Following
Prompting	3	0	5	4
Coaching	6	15	22	28
Modeling	0	0	0	0
Telling	1	0	7	7
Discussing	8	3	3	1

time, reinforcement of self-monitoring was general (e.g., "Good for you," "Excellent," "Uh huh") although at times teachers specifically commented on children's use of self-monitoring as in the following example.

Child:	Okay, Buffy, <i>she said, no ... said</i> Lucy, you win. Fetch, Buffy.	(Self-correction)
Mr. Black:	Buffy always gets her way, doesn't she?	(Prompting-meaning)
	Two things I really liked there.	(Coaching-correct)
	One was when you were talking, when the girl was talking. Okay, you made it sound just like the girl was talking.	(Coaching-structural)
	And the other thing I liked was when you checked on what you were reading.	(Coaching-strategy)

This example illustrates how Mr. Black provided several scaffolding comments following oral reading, the last focused specifically on self-correction. Both he and the other teachers more frequently reinforced children for self-correctional behavior after it occurred than prompting them to engage in self-monitoring before beginning to read.

Children made fewer metacognitive responses indicating knowledge about reading or writing than self-corrections during intervention lessons. Responses indicating awareness or knowledge tended to be precipitated by discussions although, as for self-management, coaching sometimes preceded and frequently followed these responses. An example of a typical interaction follows.

Ms. Green:	And what about this word. You were ... you almost hesitated there, and then you were able to say ...	(Discussion-strategy)
Child:	Heap.	
Ms. Green:	How did you know it was heap?	(Discussion-word strategy)
Child:	'Cause I just remembered he and then p.	(Strategy-combination)
Ms. Green:	Okay, he and then p ... Good show.	(Coaching-correct)

Conclusions and Implications

Our analysis of children's talk during reading intervention lessons showed that they provided more metacognitive comments during reading than other types of activities and when texts and tasks were relatively easy than when they were more difficult. Results also showed that children made more metacognitive responses in the self-management than in the knowledge category. From these

results, it appears that young children are able to engage in more metacognitive behavior than indicated by past research (Paris et al., 1991); however, this will occur only if tasks are at an appropriate level of difficulty. If one of the goals of reading intervention programs is to help children develop a self-improving system so that they can continue to make progress once they are no longer in programs (Clay, 1993a, b), they need frequent opportunities to read relatively easy material. When material was near the upper end of their zone of proximal development, the children in this study engaged in far less self-management than when it was near the lower end.

A considerable amount of scaffolding was provided by intervention teachers in all parts of lessons. The most frequent type of scaffold provided was coaching, confirming results in the study of teacher-child interactions by Wong et al. (1994). Coaching frequently preceded use of self-management strategies by children; the preponderance of self-corrections in the metacognitive behavior of children in this study may be a direct reflection of the heavy use of coaching scaffolds by teachers. Indeed, coaching scaffolds appear to be an effective means of facilitating children's control of their own reading and writing.

It is less clear from the results of this study how teacher scaffolds can be used to increase young children's awareness of what factors affect reading and writing, how reading and writing strategies operate, and why and when to use strategies. When children demonstrated this type of metacognition during intervention lessons, it tended to be preceded by discussing more than other types of teacher scaffolds. Wong et al. (1994) found that teachers provided considerably more discussing scaffolds when children were reading new than familiar books. In the light of the difference in the incidence of metacognition on easy as opposed to difficult tasks found in this study, an increase in discussing scaffolds using familiar books might be one way to help children think about reading and writing tasks and strategies.

Although more research is needed before definitive implications can be drawn for instruction, the results of this study and others support an approach where teachers vary the amount and type of scaffolding provided on different tasks. It is also desirable for children to have regular opportunities to reread and discuss familiar books and be reinforced for making self-corrections and talking about their reading and writing. By deliberately varying the amount and type of scaffolding provided on tasks at various levels of difficulty, teachers can facilitate children's development of metacognitive awareness and control, essential aspects of a self-improving system.

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The Impact of Interest and Strategy Use on Memory Performance for Child, Adolescent, and Adult Learners

Two experiments examined the impact of interest and strategy use on memory performance for children (ages 10-11, Experiment 2 only), adolescents (ages 14-15), and young adults (ages 19-20). In both experiments students (N=98 and N=118 respectively) were randomly assigned to one of two study strategies and were required to learn facts about animals. All students completed a questionnaire about their interest in animals. In Experiment 1 students who responded to why questions (elaborative interrogation strategy) remembered more than students who repeated the facts. In Experiment 2 children and adolescents using elaborative interrogation had greater memory performance for facts about familiar animals than their peers who selected their own study strategies. Young adults performed equally well in both strategy conditions. Most critically, in both experiments individual interest predicted memory performance for facts about familiar animals only for adolescents.

Deux expériences ont examiné l'impact de l'intérêt et de l'utilisation des stratégies sur la performance de la mémoire des enfants (âgé(e)s de 10 à 11 ans, Expérience 2 seulement), des adolescents et adolescentes (âgé(e)s de 14 à 15 ans) et, les jeunes adultes (âgé(e)s de 19 à 20 ans). Dans les deux expériences, les élèves (N=98 et N=188, respectivement) furent assignés au hasard à l'une des deux d'études stratégiques et furent obligés d'apprendre des faits au sujet des animaux. Tous les élèves complétèrent un questionnaire concernant leur intérêt par rapport aux animaux. L'Expérience 1 démontre que les élèves répondant aux questions du genre "pourquoi" (une stratégie d'interrogation élaborative) renaient davantage que ceux et celles qui répétaient des faits. L'Expérience 2 démontre que les enfants, les adolescents et les adolescentes qui utilisaient l'interrogation élaborative possédaient une mémoire plus performante pour les faits concernant les animaux familiers que leurs pairs qui avaient choisi leurs propres stratégies d'étude. Les jeunes adultes ont démontré une performance égale dans les deux conditions expérimentales. D'une importante décisive, dans les deux expériences, l'intérêt individuel prédisait la performance de la mémoire pour les faits concernant les animaux familiers seulement dans le cas des adolescents et les adolescentes.

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Students' academic success is largely dependent on their ability to develop effective strategies for acquiring new information from texts (Wood, Miller, Symons, Canough, & Yedlicka, 1993). As students progress from elementary through secondary and postsecondary education, their strategies must broaden to match the demands of more complex tasks (Brown, 1988; McKeown, Beck, Sinatra, & Loxterman, 1992). A primary objective of both educators and researchers is to determine strategies that will facilitate learning. Such research endeavors often include examination of variables that may interact with strategy use, such as effort, knowledge base, and verbal ability (Schneider & Bjorklund, 1992; Schneider & Weinert, 1990). The two experiments reported here examine the impact of domain-specific interest on children, adolescents, and young adults' memory performance when they are asked to learn factual material presented in prose.

One strategy that facilitates how students learn and remember factual information is elaborative interrogation (Pressley, Symons, McDaniel, Snyder, & Turnure, 1988; Woloshyn, Willoughby, Wood, & Pressley, 1990). With elaborative interrogation learners are asked to answer *why* questions about information that they read (e.g., "Why would that fact be true?"). The most likely explanation for the potency of elaborative interrogation is that learners are encouraged to integrate new information with their existing prior knowledge (Willoughby, Waller, Wood, & MacKinnon, 1993; Willoughby, Wood, & Khan, 1994; Wittrock, 1974). The effect of elaborative interrogation is specific to materials that access high background knowledge rather than low background knowledge. For example, Willoughby et al. (1994) found that students remembered more novel facts about common animals than novel facts about exotic animals. The purpose of this article was to extend our understanding of variables that affect the potency of elaborative interrogation. In the two experiments presented here, we assessed whether interest in the to-be-learned materials may be an important predictor of whether learners use elaborative interrogation effectively. Studies of interest also can help to establish a much needed link between research on cognitive and subject factors (Paris, 1988; Renninger, Hidi, & Krapp, 1992).

Researchers investigating the influence of interest on learning have focused on two different aspects of interest. One body of research has examined the specific characteristics of the environment that capture the learner's interest, such as the interestingness of a text (Krapp, Hidi, & Renninger, 1992). This *situational* interest tends to be transient, situation-specific, and shared among individuals (Anderson, Shirey, Wilson, & Fielding, 1987; Hidi, 1990). Examples of research on situational interest include ways that readers react to seductive details (Garner, Brown, Sanders, & Menke, 1992), and interesting sentences in text (Shirey, 1992). Another group of researchers has concentrated more on the influence of individual's long-term interest in a given domain (Renninger, 1990; 1992; Schiefele, 1991), called *individual* interest. Individual interests are specific to individuals and tend to be characterized by increased knowledge and value (Krapp et al., 1992). The focus of this article is on individual interest.

There is considerable support for Renninger's (1992) argument that individual interest is not just knowledge, but knowledge plus value. She argues that interest occurs when a student has both high knowledge and high value

for a topic relative to other things with which they are involved, whereas noninterest is when a student has high knowledge but low value for the material being studied. In contrast, having low knowledge but high value would constitute attraction to a topic that has not yet developed into an interest. Renninger's findings suggest that information may be processed differently depending on whether the task involves strictly prior knowledge (i.e., noninterest) or both prior knowledge and value (i.e., interest). Renninger suggests that the addition of value to knowledge influences the individual's subsequent activity. Value may add an energizing factor in learning that would be missing if only knowledge were present (Voss & Schauble, 1992). In other words, individuals are more likely to devote energy to increasing their knowledge about a topic if that topic has some value or attraction for them. In order for it to be labeled an interest, however, rather than just an attraction, that individual also must have some knowledge for the topic (i.e., demonstrate both knowledge and value). In contrast, there are situations, particularly in the school environment, where students acquire knowledge but do not value the topic (i.e., demonstrate noninterest).

For both child and adult populations researchers have found positive effects of an individual's interest on their ability to attend to domain-specific materials. For example, when comprehending mathematics and reading tasks for which individual interests and noninterests provided the context, grades 5 and 6 students were more accurate and more detailed in their recall of topics of interest than topics of noninterest (Renninger, 1992). Similarly, studies have indicated a relation between performance and interest for young adults (Schiefele, 1991). Although it appears that interest may affect performance across the lifespan, the developmental picture is incomplete. To date the relation between interest and performance has not been examined developmentally. The two experiments reported here extend the existing literature by including child, adolescent, and young adult populations.

Further, the experiments examine the relation between interest and strategy use. Schiefele (1991) demonstrated that adult students with higher interest in a specific topic also were more likely spontaneously to use learning strategies that made connections with their prior knowledge. Schiefele found that individuals who exhibited high interest used less literal and more meaning-oriented text processing (i.e., made inferences based on the text), made more use of other learning strategies (information-seeking, searching for main ideas, etc.), and had better recall. In this case interest and strategy use were related. However, to date the interaction between interest and strategy use following training has not been empirically tested. The present studies tested the impact of interest when strategy use was instructed. Specifically, the experiments evaluated the impact of interest when students were instructed in a strategy that encouraged them to use their prior knowledge (elaborative interrogation). This strategy was compared with a strategy that did not explicitly promote access of prior knowledge (repetition—in Experiment 1) and to spontaneous strategy use (i.e., when students studied as they would normally [self-study—in Experiment 2]).

A further goal of this study was to approximate real-life learning so that applications to typical learning situations would be more readily identifiable.

Employing an incidental learning situation may not account for the typical influence of interest on memory. Learning tasks in the classroom most often involve intentionality (i.e., a perception that the learner will be tested) on the part of the learner. To mirror this learning situation we adopted an intentional learning paradigm in our studies. In addition, students in the two experiments learned material that was ecologically valid in order to mirror learning demands that would typically be presented in the classroom (i.e., facts about animals).

Experiment 1

The main purpose of Experiment 1 was to consider the impact of interest and strategy use on memory performance with an adolescent population. In order to capture the unique role of interest for adolescents, it also was necessary to include a comparison group for whom elaborative interrogation had already been well established (Willoughby et al., 1993, Wood, Fler, & Willoughby, 1992). Experiment 1 contrasted adolescents with young adult learners. In addition, elaborative interrogation was compared with repetition, a typical default strategy for most learners (Garner, 1990). Comparing the two strategies allowed for direct comparisons with existing research (see Pressley et al., 1992 for a review) and permitted us to examine the interaction between strategy use and interest.

Method

Participants and Design

The 98 participants included 60 10th to 12th graders (M age=16 years, 3 months, SD =9 months) and 38 students enrolled in a first-year university psychology course (M age=19 years, 4 months, SD =10 months). Students were drawn from one secondary school and one university in a mid-sized Canadian city. Students at each educational level were randomly assigned to one of two experimental conditions: elaborative interrogation or repetition. Approximately equal numbers of females and males were assigned to each condition.

Materials

Materials were prepared to assess interest in animals and fact learning.

Interest. Each participant completed a four-item scaled-response questionnaire that required them to rate their interest in animals (see items marked with an asterisk in Appendix A). The questions asked how interested the respondent was in “knowing things” about animals, whether the respondent would stop at a television channel with a show about animals, whether there were “a lot of books” about animals in the respondent’s home, and whether the respondent would choose to spend time at zoos and/or aquariums.

Fact learning. Nine animal sets were constructed (see Appendix B for an example of an animal set). Each set was composed of six declarative statements typed individually on 12 cm x 19 cm cards. Each sentence described one characteristic behavior, for example, physical living environment, diet, major source of predation, etc. In addition, three practice sentences were provided, similar in format to the experimental materials, but describing different animals. All materials were taken from Wood, Pressley, and Winne (1990), who pretested the animal sets with both child and adult populations to ensure that

comprehension for the materials was similar across age. The sentences were also recorded on audiotape in a constant order.

Procedure

The experimental phase included instructions, practice, presentation of the study materials, the interest questionnaire, and a memory test.

Instructions and practice. Students were tested individually after being randomly assigned to elaborative interrogation and repetition control groups. Strategy instructions varied as a function of condition.

Students in the elaborative interrogation condition were instructed to listen to each sentence as it was spoken on the audiotape. Students then answered aloud *why* each fact would be true of that particular animal, such that the answer clearly stated why the fact would be true of the specific animal being discussed and not another similar animal.

Repetition students also were instructed to listen to the audiotape and specifically to read for understanding. Students then repeated each fact aloud for the remaining study time. Three example sentences were used to ensure that students could effectively execute their assigned strategy. Feedback was provided about their performance. For example, students in the elaborative interrogation condition were prompted to elaborate their answer further or generate another elaboration if their answer did not explain the relation between the animal and its behavior. Students in the repetition condition were reminded to read at a pace that allowed them to understand each fact.

After studying the three practice sentences, and using their instructed strategy, students were given a practice memory test to familiarize them with the testing format. Students were provided with the animal behavior in the form of a *which* question (e.g., Which animal eats clams and other shelled sea creatures?) and were required to select the appropriate animal name (i.e., walrus) from a typed list containing the three animal names.

Study phase. Students were reminded of their strategy instructions, and the nine animal sets were presented. No feedback was provided during this phase. Each sentence was presented for 15 seconds. A 15-second interval separated the presentation of each new animal set. Sentences were presented in a constant order across participants to ensure that differences in outcomes between conditions were not a function of presentation order. The experimental session was audiotaped for students in both conditions to ensure that they complied with instructions.

Interest. After all 54 facts were presented, students were given the four-item interest questionnaire (see items marked with an asterisk in Appendix A).

Memory test. After completing the interest questionnaire, each student was asked to complete a matching test. As in the practice test, the experimenter presented each of the 60 facts to the participant in the form of a *which* question (e.g., Which animal lives in a hole in the ground?). Students responded by identifying the appropriate animal. Questions were presented in a different random order for each student with the stipulation that no more than two questions from one animal set could be presented contiguously.

Results and Discussion

Consistent with previous research examining students' use of the elaborative interrogation strategy (Willoughby et al., 1994), the transcription of experimental session audiotapes confirmed that all students complied with instructions and attempted to use their assigned strategy. The memory data were analyzed by a hierarchical multiple regression analysis. The three independent variables, age, study strategy, and interest (highest correlation between the three variables was .13) were entered at Steps 1 to 3 respectively (see Table 1 for a full summary of the results).

The r^2 changes for both interest and age were significant; however, these main effects were qualified by an interaction between age and interest, which is explained below. The r^2 change for study strategy also was significant, with students in the elaborative interrogation condition outperforming their repetition peers ($M=36.82$ for elaborative interrogation and 28.38 for repetition). This finding confirms the potency of elaborative interrogation over repetition for both age groups. In addition, it extends the findings of previous research on adult and child populations (Woloshyn et al., 1990; Wood, Willoughby, Bolger, Younger, & Kaspar, 1993), and supports the hypothesis that the learning gains from elaborative interrogation do extend across development.

There was no significant strategy by interest interaction. Interest in animals did not appear to be an advantage for elaborative interrogation students over the repetition control students. Probably interest increases attention to the material regardless of instructed strategy. In fact differences may occur only in cases where students spontaneously generate study strategies (Schiefele, 1992) rather than having them imposed. Experiment 2 addresses this issue by including a self-study strategy condition.

There was a significant increase in r^2 for the age by interest interaction. Subsequent analyses indicated that the correlation between interest and memory performance for adolescents was .48, $p<.001$, whereas for young adults the correlation was .11, $p>.05$. Therefore, interest in the study material predicted memory performance for adolescents more than for young adults.

Table 1
Contribution of Age, Strategy Use, and Interest in the Prediction of Memory Performance in Experiment 1

Step	R^2	R^2 Change	F Change
1. Age	.08	.08	7.75**
2. Strategy	.29	.21	28.19**
3. Interest	.37	.08	11.58**
4. Age x Strategy	.37	.00	.09
5. Age x Interest	.41	.04	5.64*
6. Strategy x Interest	.41	.00	1.24
7. Age x Strategy x Interest	.41	.00	.02

* $p<.05$.

** $p<.01$.

This experiment suggests that there may be developmental differences in the relation of interest to memory performance.

One concern, however, is that the undergraduates may be more homogeneous in their level of achievement. Secondary school students, on the other hand, form a more heterogeneous sample. Therefore, interest may have predicted performance for the adolescents because interest was tied to achievement. To control for this possibility, adolescents’ academic achievement was measured and entered into a hierarchical multiple regression analysis. The vocabulary, reading comprehension, spelling, and language skills subtests of the Metropolitan Achievement Test (MAT6—Form L, Prescott, Balow, Hogan, & Farr, 1986) were completed by the same adolescent students. Interest and academic achievement were not highly correlated, $r=.19$, indicating that high interest scores were not restricted to students of high ability. Most critically, interest added a further r^2 change of .11 after achievement was controlled (see Table 2), suggesting that interest predicts performance over and above achievement.

Experiment 2

Experiment 2 expanded on Experiment 1 in three ways. First, this experiment included a child population. Given the impact of interest for learning with adolescents in Experiment 1 and past research where interest affected performance among child populations (Renninger, 1992), we included a full range of students—children, adolescents, and young adults—in this study. This allowed us to determine whether our findings were an artifact of adolescents alone, or whether they could be generalizable to younger populations.

Second, the present study included a self-study condition where students were encouraged to study the material as they would normally. Typically, elaborative interrogation is compared with repetition with large memory gains consistently reported for elaborative interrogation (e.g., Experiment 1; Pressley et al., 1992). Although repetition is a common default strategy, it is not necessarily the preferred strategy for all learners and, therefore, may not be the optimal control condition (Bransford et al., 1982; Wood & Hewitt, 1993). As part of our goal to approximate real-life learning, elaborative interrogation was compared with a self-study condition. In addition, the self-study strategy condition was included because the effect of interest on learning may be more

Table 2
Contribution of Strategy Use, and Interest in the Prediction of Memory Performance for Adolescents in Experiment 1

Step	R^2	R^2 Change	F Change
1. Achievement	.12	.12	7.75**
2. Strategy	.39	.27	24.88**
3. Interest	.50	.11	11.75**
4. Strategy x Interest	.50	.00	.05

* $p<.05$.
** $p<.01$.

pronounced when students have flexibility in their strategy use. Given that Schiefele (1992) noted a relation between interest and strategy use in young adults, we examined this possibility here.

Third, in the existing literature on interest, knowledge plays an important role, with some theorists suggesting that knowledge and interest are equated (Tobias, 1993) and others arguing that knowledge is one component of interest (Renninger, 1992). As mentioned, Renninger suggests that interest includes not only knowledge, but a value component. In order to determine whether the impact of interest on memory performance and strategy use operates differently when knowledge is high as opposed to when it is low, the level of students' background knowledge for the study material was manipulated in this study. Experiment 2 manipulated the familiarity of the materials by presenting materials that accessed highly-developed and less well-developed knowledge bases (i.e., novel facts about familiar and unfamiliar animals).

The results of Experiment 1 indicate that it is important to control for student variability in academic achievement. Specifically, when comparing heterogeneous samples (i.e., children and adolescents) to a more homogeneous sample (i.e., undergraduates), verbal achievement may play an important role in predicting memory performance. Experiment 2 controlled for this for the three age groups.

Method

Participants and Design

The 118 participants included 40 5th and 6th graders (M age=10 years, 4 months, SD =5 months), 38 9th and 10th graders (M age=14 years, 6 months, SD =7 months), and 40 students enrolled in a first-year university psychology course (M age=20 years, 2 months, SD =4 years, 1 month). Students were drawn from two elementary schools, one secondary school, and one university in a mid-sized Canadian city. In each educational level, students were randomly assigned to one of two experimental conditions: elaborative interrogation and self-study. Approximately equal numbers of males and females were assigned to each condition.

Materials

Materials were constructed for each of the three components of the study: verbal achievement, interest, and fact learning.

Verbal achievement. Verbal achievement was assessed through two subtests of the Metropolitan Achievement Test (MAT6—Form M, Prescott et al., 1986): vocabulary and reading comprehension. Standardized instructions were used throughout the administration of these subtests. The vocabulary test items consisted of 24 sentences. Ten minutes were given for this subtest. The 60-item reading comprehension test required students to read eight passages and then answer fill-in-the-blank multiple choice questions. Students were given 20 minutes to complete this subtest.

Interest. The six-item interest questionnaire included two more items than in Experiment 1. These questions assessed students' personal experience with animals (see Appendix A) and were designed to indicate students' value for learning about animals. Renninger (1992) suggested that learners' may not always be aware of their interests, in which case self-report questionnaires may

be problematic. Our questions attempted to address this issue by measuring interest in an indirect manner. For example, noticing different animals on the way to school may indicate interest in animals on the part of the learner of which they may be unaware.

Fact learning. Ten sets of animal facts were constructed. Five sets were about familiar animals identical to those in Experiment 1 (Swift Fox, House Mouse, Little Brown Bat, Townsend Mole, and Western Spotted Skunk) and five described unfamiliar animals (i.e., Pronghorn, Coati, Chickaree, American Pika, and Collared Peccary, see Appendix B for an example of a familiar and an unfamiliar animal set). As in Experiment 1, each set of animal facts was composed of six declarative statements that outlined six characteristic behaviors of each animal. Facts were drawn from Willoughby et al. (1993) and Wood et al. (1990) who pretested the facts for familiarity. The 10 animals were chosen because these students indicated unanimously that they were either familiar with the animals (selected for familiar animals) or unfamiliar with the animals (selected for unfamiliar animals). Sentences typed on separate cards were presented at 15-second intervals via an audiotape recording.

Procedure

The students met on two occasions, the first time in a group to complete the verbal achievement measure, and the second time individually to complete the experimental phase.

Verbal achievement. All students were tested in a familiar room in their school. Instructions complied with standardized procedures.

Experimental phase. This phase included instructions, practice, presentation of the study materials, interest questionnaire, and memory test. All procedures were consistent with Experiment 1 for the elaborative interrogation condition. In the self-study condition, students were instructed to study as they would normally. When presented with three example sentences, students in the self-study condition were asked to describe orally how they were going to learn the item.

Students were reminded of their instructions before study, and the 10 animal sets were presented without feedback. Each sentence was presented for 15 seconds, with an 15-second interval separating the presentation of each animal. The experimental session was audiotaped for students in both conditions to ensure that students complied with instructions. After all 60 sentences were presented, students were given the 6-item interest questionnaire followed by the 60-item memory test.

Results and Discussion

The transcription of experimental session audiotapes confirmed that all students complied with instructions and attempted to use their assigned strategy. The primary concern of this experiment was to examine the impact of interest on memory performance for child, adolescent, and adult learners. Two planned hierarchical multiple regressions were conducted, one for memory about the familiar animals and one for memory of the unfamiliar animals. The three independent variables—academic achievement, study strategy, and interest—were entered in each regression analysis at Steps 1, 2, and 3 respectively

(highest correlation between the three variables was .14, see Table 3 for a full summary of the results).

The r^2 change for study strategy was significant for the elementary and secondary school groups, but only for memory of the facts about the familiar animals (see Table 4 for a summary of the memory performance means). With these two younger age groups, elaborative interrogation was associated with greater memory performance than self-study. We suspected that younger learners in the self-study condition may have used less sophisticated strategies than the university students. To examine this, transcriptions of the experimental sessions were examined and strategies spontaneously used in the self-study condition were scored into one of three categories: repetition, higher order, and failure to respond while studying. Strategies such as imagery, verbal elaboration, and analogy were coded as higher-order strategies. Thirty percent of the strategies used by the self-study group were scored by two raters to determine interrater reliability. There was 97% agreement in classification of strategies. The remaining strategies were scored by one rater. Comparisons across age in the self-study condition confirmed that young adults used significantly more higher-order strategies (30%) than either children (19.5%) or adolescents (14.4%), smallest $t(56)=5.70, p<.05$. Children and adolescents did not differ. It appears that undergraduates use sophisticated strategies spontaneously and are less likely to gain an advantage from an imposed strategy such as elaborative interrogation.

Table 3
Contribution of Strategy Use and Interest in the Prediction of Memory Performance in Experiment 2 for each Age Group

Step	Familiar Animals			Unfamiliar Animals		
	R^2	R^2 Change	F Change	R^2	R^2 Change	F Change
<i>Grades 5 and 6</i>						
1. Achievement	.08	.08	3.16	.10	.10	4.14*
2. Strategy	.20	.12	5.87*	.15	.05	2.10
3. Interest	.23	.03	1.07	.20	.05	2.57
4. Strategy x Interest	.25	.02	1.19	.27	.07	3.41
<i>Grades 9 and 10</i>						
1. Achievement	.15	.15	5.92*	.28	.28	13.29**
2. Strategy	.41	.26	15.19**	.33	.05	2.75
3. Interest	.48	.07	4.17*	.33	.00	.19
4. Strategy x Interest	.48	.00	.36	.39	.06	2.86
<i>First-year university</i>						
1. Achievement	.20	.20	9.38**	.26	.26	13.12**
2. Strategy	.25	.05	2.47	.26	.00	.01
3. Interest	.30	.05	2.11	.32	.06	2.96
4. Strategy x Interest	.34	.04	2.04	.32	.00	.17

* $p<.05$.

** $p<.01$.

Table 4
Mean Memory Performance for Familiar and Unfamiliar Animals as a
Function of Study Condition and Grade in Experiment 2

<i>Condition</i>	<i>Familiar Animals Mean (SD)</i>	<i>Unfamiliar Animals Mean (SD)</i>
<i>Elaborative Interrogation</i>		
Grades 5 and 6	15.75 (5.57)	7.85 (4.82)
Grades 9 and 10	16.47 (4.73)	9.16 (4.06)
University	20.95 (5.61)	12.75 (6.27)
<i>Self-Study</i>		
Grades 5 and 6	11.70 (4.13)	5.85 (2.37)
Grades 9 and 10	10.79 (3.71)	6.74 (3.87)
University	17.20 (6.29)	11.70 (5.45)

Note. Maximum score=30 for familiar and unfamiliar animals.

As with Experiment 1 there was no significant strategy by interest interactions (see Table 3). Interest in animals did not appear to be an advantage for self-study relative to elaborative interrogation students. We anticipated that interest may have particularly influenced strategy selection in the self-study condition, similar to the findings of Schiefele (1991). For example, in the self-study condition students with high interest in animals may have spontaneously used more sophisticated strategies when learning the information, and so may have had higher memory scores than students with low interest in animals. However, this was not the case here, probably because students were exposed to an intentional learning task in the present study unlike the incidental instructions provided by Schiefele. This finding concurs with previous strategy research that demonstrates that when students are informed of an upcoming test, they employ more sophisticated strategies that enhance their learning (Pressley et al., 1988).

More importantly, the findings of Experiment 2 replicate Experiment 1 in that interest significantly predicted memory performance only for the adolescents when they studied facts that were similar to those used in Experiment 1 (i.e., facts about familiar animals). Consistent with both Tobias (1993) and Renninger (1992), only when knowledge is high (i.e., when learning information about familiar animals) does interest have any impact. However, the value component of Renninger's theory may account for the significant influence of interest on memory performance only for one of the three populations. Again, the difference between adolescents and young adults suggests that experience with studying may have a compensatory function. Where young adults have experience with studying materials that may not tap their individual interests, adolescents have less experience and so may rely more heavily on their individual interests to energize their learning. Given differences in experiences, it could be expected that young children would perform less well than adolescents. This was not the case, however, probably because learning factual content about animals directly corresponds with ongoing classroom learning situations in elementary schools and because learning about animals may be

inherently interesting to children. Thus the children's performance reflects both energy and experience. Consistent with this hypothesis, children were more interested in animals than the adolescents and young adults, $F(2,113)=13.88$, $p<.001$, with no significant difference between the adolescents and young adults [$M(SD)=14.88$ (2.60), 12.05 (2.37), 12.21 (2.98) respectively].

General Discussion

In summary, these two experiments identify the importance of domain-specific interest for adolescent learners when learning information about animals. Young adults appear to be experienced in learning materials regardless of interest. Initially, we thought interest might be equally valuable for both adolescents and children. This hypothesis was not supported in the present study because children appear to be both interested and experienced with learning animal facts. We suggest that adolescent engagement with this learning situation may be promoted only when there is a high level of interest. Interest in the sense of value over and above knowledge may be particularly important for them because it serves as an energizing factor for attending to the material. These data are consistent with Renninger's (1992) categorization of interest as both stored knowledge and value. That is, interest occurs when a learner has both high knowledge and value for a topic. In other words, adolescents have some experience and knowledge for animal facts, but require value for the topic to provide an energizing factor to their learning.

The interest questionnaire employed in this study offers a first exploration into creating a measure that attempts to examine both the knowledge and value components of students' interest in animals. These two components, however, were not clearly separated in the questionnaire. An extension to this study that we are currently exploring is to refine the questionnaire in an effort to examine in more detail the impact of both knowledge and value (i.e., interest) on strategy use and memory.

The two experiments employed an intentional learning paradigm. Intentional learning mirrors learning in the classroom and therefore has more applications to real-life situations where students expect to be tested on novel information. Some previous studies have found a positive effect of interest on learning for children and young adults when an incidental learning paradigm was used (Schiefele, 1991). It may be that if students are unaware of the upcoming memory test, the influence of interest may be more powerful. Future research should examine the difference in effect between incidental and intentional learning contexts in order to understand the role of context in memory performance.

In addition, the impact of imposed strategies was studied in Experiment 1. Consistent with past research, elaborative interrogation was associated with greater memory performance than repetition for both adolescents and young adults. In the second study, the opportunity for students to use their preferred strategies was compared with the imposed strategy of elaborative interrogation. Elaborative interrogation was found to be particularly valuable for younger populations, suggesting that these learners lack sophistication in their natural study habits but that training in strategies such as elaborative interrogation will be beneficial.

Together these two studies highlight the importance of including measures other than simple cognitive interventions even when studying cognitive processing. Typically, strategy research has examined only cognitive reasons for why students do not always use appropriate strategies as much as they could. The present study suggests that the area of strategy research would benefit from including noncognitive variables such as interest to provide insight into when and why students use specific strategies. The findings also suggest that educators have to be sensitive to noncognitive factors, such as interest, in order to maximize learning in their classrooms. Given that the effects of interest were specific to one age group in particular, we recommend that educators and researchers be alert to the developmental changes in the variables that affect students learning.

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Appendix A
Interest Questionnaire

Answer the following questions on this sheet of paper. Circle the best answer for each question.

*1. Are you interested in knowing things about animals?

- | | | | | |
|------------|---|------------|---|------------|
| 1 | 2 | 3 | 4 | 5 |
| very | | somewhat | | not |
| interested | | interested | | interested |

2. Do you have a pet at home?

- | | |
|-----|----|
| Yes | No |
|-----|----|

*3. When you're looking for a TV show to watch, would you stop at a channel that had a show about animals?

- | | | | | |
|----------|---|-----------|---|-------|
| 1 | 2 | 3 | 4 | 5 |
| most of | | sometimes | | never |
| the time | | | | |

4. When you're walking to school (or on your way to school), how many different types of animals do you see?

- | | | | | |
|-----------|---|-------------|---|------|
| 1 | 2 | 3 | 4 | 5 |
| more than | | about three | | none |
| 10 | | | | |

*5. Do you have a lot of books about animals at home?

- | | |
|-------------------------|----|
| Yes | No |
| Do you read them often? | |
| Yes | No |

*6. If you had a choice would you spend time at:

- | | | |
|------------|-----|----|
| Zoos? | Yes | No |
| Aquariums? | Yes | No |

Note. *The four questions with an asterisk comprised the interest questionnaire for Experiment 1 (total possible score=14). For Experiment 2, all six questions were included (total possible score=20).

Appendix B
Example of a Familiar and Unfamiliar Animal Set

Western Spotted Skunk (Example of a familiar animal used in Experiments 1 and 2)

1. The Western Spotted Skunk's hole is usually found on a sandy piece of farmland near crops.
2. The Western Spotted Skunk mostly eats corn.
3. The biggest danger to the Western Spotted Skunk is the great horned owl.
4. The Western Spotted Skunk lives in a hole in the ground.
5. Often the Western Spotted Skunk lives alone, but families of skunks sometimes stay together.
6. The Western Spotted Skunk is able to live close to people but never be seen.

Collared Peccary (Example of a unfamiliar animal used in Experiment 2)

1. The Collared Peccary lives in southwestern United States.
2. The Collared Peccary eats roots and cactus.
3. The biggest dangers for the Collared Peccary are the jaguar and mountain lion.
4. The Collared Peccary often rests in a thicket or under a large boulder.
5. There are no apparent leaders among the Collared Peccary males and females.
6. The Collared Peccary's stomach has two sections.

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Violence in Schools: Multiple Realities

The topic of school violence is becoming an increasingly contentious issue. Claims are made by parents and the media that educators are intentionally downplaying the true nature and extent of the problem. Educators, on the other hand, accuse the media of playing on isolated incidents in order to fuel public hysteria. Unfortunately, many of the supporting data for both sides of the issue have been drawn from largely secondary sources (e.g., teachers, politicians, the media, police), not from students themselves. This article reports the key findings from an Alberta-based study that sought to explore perceptions of junior high school students and administrators as to the management of violent incidents in their schools. Data were drawn from questionnaires of 231 students and 27 administrators in five schools, representing public and separate school jurisdictions, grades 7 to 9. Students were asked to indicate: (a) their satisfaction with the way schools dealt with victims and perpetrators of violence; (b) the extent to which they perceived certain behaviors were a problem in their school; and (c) circumstances under which they would report the witnessing or victimization of violence. The study found that students intentionally do not report most incidents of violence from a fear of reprisals, a belief that such behaviors are normal, and a lack of satisfaction with how victims and perpetrators of violence are dealt with by school staff.

La violence à l'école devient un sujet de plus en plus controversé. Les parents et les médias affirment que les éducateurs et les éducatrices minimisent volontairement la véritable nature et l'étendue du problème. D'autre part, les éducateurs et les éducatrices accusent les médias de mettre en évidence des cas isolés afin d'alimenter une certaine hystérie publique. Malheureusement, les données en faveur des deux points de vue proviennent de sources secondaires (par ex., les enseignants et les enseignantes, les politiciens et les politiciennes, les médias, la police) et non des élèves eux-mêmes ou elles-mêmes. Cet exposé met en relief les résultats importants d'une étude albertaine dont le but principal consistait à découvrir les perceptions des élèves du niveau secondaire premier cycle, des administrateurs et des administratrices relatives à la gestion d'incidents violents dans leurs écoles. Les données proviennent des réponses à un questionnaire de 231 élèves (à partir de la septième jusqu'à la neuvième années) et de 27 administrateurs et administratrices dans cinq écoles différentes représentant les juridictions scolaires publiques et séparées. Les élèves devaient indiquer: (a) leur degré de satisfaction du traitement par l'école des victimes et des auteur(e)s de la violence, (b) leur degré de perception concernant les problèmes que posent certains comportements dans leur école et, (c) dans quelles circonstances rapporteraient-ils ou elles les actes de violence dont ils ou elles seraient témoins. L'étude démontre que les élèves consciemment, ne signalent pas les incidents violents par peur de représailles, par une croyance que de tels comportements sont normaux et, par une insatisfaction vis-à-vis la manière de régler le cas des victimes et des auteur(e)s de violence par le personnel de l'école.

The youth violence observed in North American communities is increasingly presenting itself in Canadian schools, underscoring the concern some educators express regarding the commonness of behaviors that seriously disrupt

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student learning. Although a concern in the United States for over two decades (Marvin, McCann, Connolly, Temkin, & Henning, 1976) the topic of school violence in Canada has only recently generated serious study (Alberta Education, 1996). The modest amount of research that does exist largely examines the nature and extent of the problem (Smith, Bertrand, Arnold, & Hornick, 1995) or attempts to gather information regarding the programs and practices that currently exist to curb violence in schools (Day, Golench, MacDougall, & Beals-Gonzalez, 1995; Gabor, 1995).

Notwithstanding the valuable contribution of such research into youth violence, the study of school violence must move toward a deeper examination of those issues that will facilitate the development of more effective and appropriate policies. One such area of inquiry is an understanding of how and why student victims, perpetrators, and observers respond to the school-based violence that they experience. This article introduces research exploring such issues through the viewpoint of students at five central Alberta junior high schools, grades 7-9. The article also aims to (a) interpret the meaning of violence in the school setting, (b) summarize recent data related to the response of students and school staff to violence, (c) outline some of the challenges facing educators in reducing school violence, and (d) offer recommendations for developing or enhancing strategies directed at prevention and response to violence in schools.

Purpose of the Study

In order to mitigate the effects of violent behaviors, schools are establishing policies and practices with the intent of responding effectively to student victims, witnesses, or perpetrators. To date there is little understanding of the students' chosen response to violence and its influence on the management of the broad spectrum of violent activities they experience. The study was designed to explore the perceptions of junior high school students and administrators with respect to the nature, extent, awareness, and management of violent behaviors in their schools.

Student perceptions regarding their understanding as victims and perpetrators of the nature and frequency of school violence as well as their perceptions of teachers and administrator awareness of, and response to, such behaviors was presented in an article published in *The Canadian Administrator* (MacDonald, da Costa, & Maynes, 1996). The findings reported in that article pointed to (a) a significant "perception gap" between administrators and students, (b) more student observers than victims or perpetrators of violence, (c) lack of student confidence in knowing how to deal with potentially serious conflicts, (d) student hesitance about reporting violence due to a fear of retaliation, and (e) an increased willingness on the part of students to accept violence as a part of their schooling experience.

The data presented in this article deal more specifically with that portion of the same study that focused on how students manage school violence, and specifically the variables that most influence students' reporting of violence and their perceptions regarding the school's responses to the victims, perpetrators, and observers of violent behaviors. Where appropriate and meaning-

ful to the discussion, findings reported in MacDonald (1996) are combined and referred to.

Review of the Literature

Defining School Violence

Historically, school violence has been synonymous with criminal activities occurring in schools: gang wars, illicit drug use, vandalism, weapon possession, and personal assault. The problem with identifying violence in such narrow, legalistic terms is that it remains an issue of law enforcement (Mawhinney, 1995). In fact violence is an issue addressed in many legalistic and non-legalistic terms: "Violence is unjust or unwarranted exercise of force, usually with the accompaniment of vehemence, outrage, or fury" (Black's Law Dictionary, 1990). "Violence is the threat of/or use of force that injures or intimidates a person (makes that person feel afraid) or damages property" (British Columbia Teachers' Federation Task Force on Violence, 1994). "Violence is anything that denies human dignity and leads to a sense of helplessness or hopelessness" (Martin Luther King).

From the point of view of teachers or school administrators, school violence encompasses those behaviors that seriously disrupt the safe learning environment of classrooms or schools. It includes "anything that affronts a child or teacher or staff member's ability to function in a safe, conducive learning environment" (Wiseman, 1993, p. 3). Although it is beneficial to frame the meaning of school violence in words that are meaningful and comprehensive, the danger lies in expanding the context to include a plethora of behaviors and activities that are properly considered disruptive, but not necessarily violent. As West (1993) argued, such broad definitions of violence serve to distort and unduly escalate the "moral panic" associated with school violence discussions. Ten years ago concerns were already being expressed suggesting that grouping behavioral or discipline problems together with crime and violence would lead to public hysteria (Wayson, 1985).

At the same time, it is beneficial to broaden the definition to include non-physical acts, harassment, and verbal slurs, recognizing that the victims of many violent, unindictable, delinquent behaviors should not be ignored. The debate over how youth crime and violence are defined and quantified continues (Dolmage, 1996), and this is why any policies and practices that address school violence must be rooted in unambiguous and consistent definitions of the behaviors and activities they seek to prevent or respond to.

In order to provide a workable definition of violence in this study, a group of students were asked to provide a list of those behaviors that they could identify under the category of school violence. It is within this context, as authenticated by students themselves, that school violence is framed in this article.

Extent of School Violence

A survey of police services and school boards across Canada (Gabor, 1995) found that 80% of respondents felt that there was more violence in schools now than 10 years ago. Thirty percent considered the situation "much worse" and none believed that the incidence of school violence was lessening.

In 1995, 962 junior and senior high school students in southern Alberta (Smith et al., 1995) identified nine types of victimizations: "something damaged, something stolen, something taken by force, threatened, slapped or kicked, threatened with weapon, attacked by group/gang, someone exposed themselves, sexually touched against will." Of these something stolen (55.6%), something damaged (43.6%), being threatened (42.3%), and being slapped or kicked (37.1%) were the most prevalent victimizations identified by students. These students also indicated that victimization rates were higher at school (81%) than elsewhere (69%), thus challenging those who believe that youth violence is a problem more prevalent in the larger community than in schools.

A survey of urban junior high school students in Alberta (MacDonald, 1996), found that over one half of students had experienced physical forms of violence (e.g., fights, bullying, punching, hitting, grabbing), verbal threats, and theft or damage of property. One fifth of male students indicated that they had been threatened with a weapon at school. Sexual harassment was experienced by over 25% of female students, and ethnic conflict affected one quarter of the student participants. Despite the fact that only 4% of students responded that they never felt safe at school, 20% of students had observed weapons in their schools, and over 50% considered bullying to be "a very big" or "big" problem.

The Code of Silence

Studies that have collected student data point to a number of violent behaviors that are typically underreported or underplayed by adults (Heath, 1994; Kasian, 1992; Mathews, 1994; Pepler & Craig, 1994; Ryan, Mathews, & Banner, 1993; Walker, 1994). A US study of peer bullying and sexual harassment (Shakeshaft et al., 1995) indicated that many students complained that school personnel did not intervene when observing student-to-student harassment. Furthermore, students often perceived that many of their teachers themselves encouraged such behaviors by their own behavior toward them. Garofalo, Siegel, and Laub (1987) found that some children may feel that adults are inept or not interested in protecting them from bullies, and, accordingly, children consciously chose to keep their victimization to themselves.

Ryan et al.'s study (1993) of Toronto students found that 38% of students who had indicated that they had been victimized at school never reported it. Staff may, therefore, not be aware that students are experiencing violence. Mathews (1994) suggested that the problem is compounded by staff who often intentionally underplay incidents, even when they have been brought forward by students. Both these factors contribute to what he referred to as the "code of silence."

Research Method

This study was exploratory in nature, given the limited amount of research conducted on students' perceptions of school violence. Its primary purpose was to develop the beginning of an understanding of the issues and identify areas for further research. This study did not seek to advance generalizations on the topic of school violence or, more specifically, violence in Alberta's junior high schools.

Sample

Data were gathered using a two-pronged approach: (a) a questionnaire was used to collect data from the administrators and students of five selected junior high schools; and (b) questionnaires were mailed to the 39 junior high school administrators of the three districts used in the student survey.

Primary data source. The sample of students completing the questionnaire was dictated by three factors: (a) school selection by district central administration (there was one exception, the principal of one school contacted the researcher and asked that his school be included in the study for reasons not provided); (b) class selection by the schools' principals; and (c) individual student participation by providing signed and returned student and parental consent forms. Individual classes were designated by the principals for study by the researcher, so the sample of students and principals was not randomly selected.

The sample consisted of 231 grades 7, 8, and 9 students drawn from five central Alberta junior high schools. The students and the principals of the respective schools were asked to complete a questionnaire consisting of 13 Likert-type questions. One open-ended question was included at the end of the survey asking participants about their thoughts on school violence.

Of a possible 381 students a total of 231 completed the questionnaire; this represented 56% females ($n=130$) and 44% males ($n=101$). Five principals of the selected schools were requested to complete a questionnaire similar to that of the students. These were completed while the students were administered surveys by the researcher.

Secondary data source. Questionnaires were mailed to the 39 junior high schools in the three districts represented. Twenty-three junior high school administrators completed a mailout questionnaire, representing approximately a 60% response rate.

School Demographics

All five schools in the study were stand-alone junior high schools, four public and one public-separate. Schools that participated in the study were representative of a broad spectrum of socioeconomic conditions. Two schools were located in an urban center with a population of approximately 60,000. The community consisted of largely white middle- to upper-middle-class residents. This community has a high percentage of young families, those with children 10-14 years of age being predominant.

The remaining three schools were also located in a large urban center with an approximate population of 800,000 people. These schools serve communities that are densely populated, multicultural, and consist primarily of lower to lower-middle-class people. Youth crime, especially ethnic gang-related crime, is a problem in these areas.

Student Questionnaire

The student questionnaire solicited the following types of data: (a) personal data regarding the students' grade and sex, (b) data related to the types of violent behaviors the student had experienced and/or observed at school, (c) the perceptions of the seriousness of specified violent behaviors, (d) perceptions the student had of the principal's and teachers' awareness of school

violence, (e) the perceptions the student had of their personal ability to deal with specified conflict, (f) student perceptions of the conditions in which he or she would inform a teacher or principal about witnessing or being victim of specified violent behaviors, and (g) an opportunity for the student to provide additional comments regarding school violence.

Questions relating to student satisfaction of the school's management of violence addressed how either victims or perpetrators of violence were dealt with by school administrators and teachers. Students' responsibility for responding to violence was assessed by exploring which variables most influenced their decision to report violent behaviors at school. Students were asked to choose from a list those conditions where they would inform a teacher or administrator about witnessing or being a victim of specific violent behaviors. The variables were: (a) the type of violent behaviors; (b) the relationship to the perpetrator as a witness or as a victim; (c) the relationship to the victim as a witness; (d) whether the victim, perpetrator or witness was older, younger, female, male, popular, unpopular, physically larger, physically smaller; and (e) whether others witnessed the victimization. Data were gathered to allow analysis on the basis of many variables including grade, gender, the perceived seriousness of the incident, and the relationship to the victim or perpetrator of school violence.

Administrator Questionnaire

The administrator questionnaires asked the same questions as those asked of students. The only difference was that the questions were reworded to reflect the administrative context. As well, this questionnaire did not provide as many variables for selecting conditions under which students would report victimization or witnessing of violence (e.g., relationship to the perpetrator).

Data Analysis

A number of methods were used to analyze questionnaire data: (a) frequency counts and percentages were derived for appropriate questions; and (b) comparisons were made of responses based on grade and sex to determine if differences existed among groups: gender, student grade, students, and administrators. Responses to the open-ended question were analyzed thematically.

To test for significant differences ($\alpha=0.05$) among pairs of data (e.g., male/female, administrator/students) *t*-tests were performed using SPSS 4.0 for Macintosh. Analysis of variance between grades used the Scheffe procedure of multiple comparisons with α set at the 0.05 level. This was done to determine which pairs of grades (7, 8; 7, 9; or 8, 9) had significantly different means.

Written responses were analyzed on the basis of emergent themes related to issues identified through the review of related research. Selected comments were used to enhance and supplement relevant statistical findings.

Findings and Discussion

The findings obtained from the data collected from the sample of 231 students and their principals are summarized below. The analysis and discussion is divided into four subsections: (a) student perceptions of observed versus personally experienced violence, (b) perceptions of the schools' management of violence, (c) reporting of violence, and (d) administrators' perceptions.

Student Victimization and Witnessing of School Violence

In order to determine the breakdown of the student population that was directly and indirectly affected by school violence, students were asked to indicate based on observation and personal experience what they perceived to be the extent of certain violent behaviors in their school. The highest ranking problems, both observed and experienced, were: teasing, swearing, name calling; theft/vandalism; bullying; and punching, hitting, grabbing. Contrary to the recent media reporting (Stewart, 1995), threats with weapons were perceived to be a “little problem” or “no problem” by over 80% of student respondents.

Interestingly, both female and male students observed and experienced similar forms of violence. Sexual harassment was reported only slightly higher for female students.

Grade comparisons based on personal observations, indicated that grade 7 students considered verbal threats to be a bigger problem than did students in either grade 8 or 9 (see Table 1). And yet a significantly larger percentage of grade 8 students had experienced verbal threats; punching, hitting, grabbing; bullying; and ethnic conflict and yet did not consider these behaviors as “big” or “very big” problems. One possible explanation for this difference is that although grade 8 students experience more violence, they are conditioned to be more tolerant of such behaviors and therefore do not consider them to be a big problem. Ryan et al.’s (1993) study of Toronto students pointed to similar trends and postulated that such normalization of violence occurs as students grow older and become more indifferent to those behaviors that they begin to interpret them as a common aspect of their school experience. Several student comments would appear to support this view:

Table 1
Percentage of Students who have Experienced Behaviors
by Grade and Gender

<i>Behavior</i>	<i>Grade 7 (n=87)</i>	<i>Grade 8 (n=71)</i>	<i>Grade 9 (n=73)</i>	<i>Males (n=101)</i>	<i>Females (n=130)</i>
Teasing, swearing, name-calling	79.3	85.9	86.3	83.2	83.8
Verbal threats	66.7	71.8	60.3	74.3*	60.0
Theft, vandalism	60.9	64.8	63.0	62.4	63.1
Fights	44.8	59.2	50.7	71.3*	35.4
Bullying	42.5	59.2	54.8	64.4*	36.9
Punching, hitting, grabbing	40.2	50.7*	60.3	70.3*	40.0
Being spat upon	23.0	29.6	32.9	27.7	28.5
Ethnic conflict	16.1	33.8*	27.4	34.7*	17.7
Sexual harassment	16.1	32.4*	23.3	17.8	27.7
Threat with weapon	13.8	14.1	19.2	19.8	12.3

Students were asked to mark with a checkmark from a list provided what they had experienced at school.

*Significant difference at $\alpha=0.05$.

I'm not saying that school violence is the right thing to do but its normal and we just put up with it. (grade 8 male)

Fights are sometimes just a way for people to solve an argument or a deal with only hurting each other not everyone around them. I think that teachers should let students fight supervised so that the weapons are controlled. (grade 8 male)

I feel badly when little kids get picked on. But everyone has there [sic] time in there [sic] life when they get picked on! (grade 9 female)

Management of School Violence

On the whole, students perceived administrators as being less aware of all the violent behaviors they experienced. Student confidence in staff awareness differed between grades; grade 7 students were more confident than either grade 8 or 9 students that staff were aware of violence. Overall, students' perceptions of teacher awareness were lowest for behaviors that were deemed most prevalent (e.g., verbal threats, teasing, swearing, name-calling; bullying; and theft or damage of property). The following comments highlight a belief by a number of students that violence was largely ignored or unseen.

I think that there is alot of conflict within our school. There is so much going on, and yet no one does anything about it. (grade 8 female)

Some things are so common that they are ignored ... teachers don't care enough about name calling, ethnic fights, teasing and stealing. They only care if blood is spilled so they can't be charged. Name calling can be hurtful but nobody cares. (grade 8 female)

It is not surprising, then, that students also indicated they were not always satisfied with the school's response to the participants of violent behaviors. Over half of the students were dissatisfied with how victims of violence were treated, in particular the victims of (a) bullying, theft/vandalism; (b) teasing, swearing, name-calling; and (c) sexual harassment. Students were least satisfied with the way perpetrators of teasing, swearing, name-calling, and sexual harassment were dealt with by staff. In all categories significantly more students were dissatisfied with the school's response to victims than to perpetrators. Many of the students' comments highlighted the needs of victims:

I think the teachers should be more involved with what goes on at school and try helping the victims. (grade 7 female)

More could be done if there was programs for picked on kids, showing them how to ignore and to not be afraid to tell or to tell how you feel to a teacher. (grade 7 male)

Sometimes the principal never does anything. I was threatened by a lot of popular people, that is why I never want to be popular. (grade 8 female)

Reporting Violence

Students were asked to complete a series of questions in tabular format in order to provide a better understanding of the circumstances under which they would take responsibility for informing an adult (teacher or principal) of a violent incident that they had witnessed or were victims of. Using a Likert-type scale each of the 10 behaviors was separated into two categories of perspectives: as a victim and as an observer. The variables were: (a) the type of violent

behavior; (b) the relationship to the perpetrator as a witness or as a victim; (c) the relationship to the victim as a witness; (d) whether the victim, perpetrator, or witness was older, younger, female, male, popular, unpopular, physically larger, physically smaller; and (e) whether others witnessed the victimization. A sample choice read, "If you were a victim of bullying, and the perpetrator was older, you would *always* tell a teacher/principal?"

Thirty-five percent of students responded that they would never tell if they witnessed any violent behavior, regardless of their relationship to, or characteristics of, the victim or perpetrator. When including items marked "sometimes," this number doubled to 70%. A number of behaviors stood out more favorably in terms of student reporting, however. Approximately 40% of students indicated that they would always tell as victims or witnesses of sexual harassment and threats with weapons. This number dropped to 30% for ethnic conflict.

Students were most undecided about reporting sexual harassment (7.3%) and ethnic conflict (8.8%). In regard to sexual harassment, students also responded that teachers were least aware of this behavior and treated victims ineffectively. This was not the case for ethnic conflict, a behavior students considered well managed by school staff.

Student observers of school violence were more likely to report incidents to teachers if there were no other student witnesses present. In rank order, students indicated that they would report victimization more readily if the perpetrator was: (a) not a friend, (b) younger, (c) physically smaller, (d) unpopular, and no one else was watching.

In many cases students stated that they intentionally did not, or would not, report victimization or witnessing of school violence under any condition:

Most of the time the kids won't involve [sic] teachers or adults and the victim will keep being the victim till someone tells which doesn't happen. (grade 7 female)

We're all one family of teenagers and we stick up for each other. (grade 7 female)

People who "rat out" or tell on people are liable to be beaten up so I just kind of stay out of it. (grade 8 male)

I won't rat on anyone because I don't want anyone to come after me. (grade 9 male)

The small proportion of students who would report violence is not surprising, given some of their comments:

I have seen the victims and witnesses who had told on the person making the fights, who have been beaten up for it. (grade 7 female)

I think that teachers can postpone fights that involve school students, but they can't stop them and no one will come to a teacher. (grade 8 male)

Fights are really brutal and nobody tells because then they'll get beaten up. (grade 9 female)

Kids are scared to rat on other kids because they will get the shit kicked out of them. This is wrong. I wish things would change. (grade 9 male).

A number of students provided reasons for their failure to report witnessing or being a victim of school violence. One of the most common themes expressed related to a fear of retaliation; this finding is consistent with other studies (Ryan et al., 1993; Kasian, 1992):

If you can help get school violence like bullying out it will feel safer except that often you will tell on someone they will want to fight ... so you have to protect the victims. (grade 8 male)

I can't defend myself or he'll get more of his friends that are tougher than mine. (grade 9 male)

A belief that taking matters into their own hands was an effective solution was also expressed by many of the students:

Popular people beat geeks up and I think people should start carrying weapons to protect themselves. (grade 8 female)

If someone is beating you up you have the right to beat them up. (grade 9 female)

Fear of becoming a victim of violence also dominated many of the written remarks:

I think that school violence should try to be stopped, because some people are afraid to even come to school, because they think they're going to be beaten up. (grade 8 female)

Sometimes in the morning coming to school or passing a different Jr high or high school I feel insecure. I try to walk by quickly or get to class. When someone tells me someone is out to get me. I get scared. I look around before I go outside and look inside the bathroom before I go. (grade 8 male)

The only way to keep yourself from being a victim is to stay out of other people's business and don't say anything stupid that could get people made at you. (grade 9 female)

In terms of behaviors, students were least likely to report teasing, name-calling; and verbal threats. A study of 1,000 middle and high school students in New York State (Shakeshaft et al., 1995) found that students were so used to being told by parents and school staff to ignore offending verbal harassment that they were effectively conditioned not to report it. Although this hypothesis cannot be substantiated in this study, it does offer a possible explanation for the high percentage of students who would not report verbal harassment.

Threats with weapons and sexual harassment ranked the highest in terms of students' willingness to report, although not as much as administrators presumed they would. Students also saw these behaviors as more prevalent than did administrators. Although rated the lowest by students in their ability to deal with effectively, most students indicated that sexual harassment and weapons threats were the most serious infractions of all the 10 listed. Regarding sexual harassment, males indicated significantly higher confidence in their ability to deal with this, and this is perhaps why male victims were also more likely to report victimization, as well as witnessing, than female students. The opposite tendency emerged with respect to reporting theft or vandalism; more female students reporting than male. Yet females reported that they were less able to deal effectively with theft or vandalism than their male counterparts. It

would, therefore, seem that educating students as to the seriousness of a wide range of violent behaviors has a powerful influence on reporting, perhaps more than teaching students how to manage these situations should they arise.

The highest percentage of students undecided about whether to report witnessing violence were those who witnessed sexual harassment (7.3%) and ethnic conflict (8.8%). Interestingly, students also responded that teachers were seldom aware of sexual harassment and victims were not dealt with effectively. It is not known from this study if either of these variables influenced students' indecision.

Administrators' Perceptions

Of a possible 39 respondents in the secondary data source 23 administrators completed and returned a mailed questionnaire. After aggregating the responses from these 23 respondents as well as the five primary administrators, analysis of variance between administrators' (*n*=28) and students' (*n*=231) questionnaire responses showed significant differences (α =0.05) as summarized (see Table 2).

1. Administrators perceived that students were more satisfied with the treatment of victims and perpetrators of violence than students did.
2. Administrators felt that they and their staff were more aware of school violence than did students.
3. Administrators were more confident that students would report victimization or witnessing violent behaviors, with the exception of threats with weapons.

Table 2
Awareness of Behaviors and Satisfaction with Treatment of Victims
and Perpetrators: Administrators vs. Students

Behavior	Awareness		Satisfaction with Treatment of Victims		Satisfaction with Treatment of Perpetrators	
	Administrators (<i>n</i> =28)	Students (<i>n</i> =221)	Administrators (<i>n</i> =28)	Students (<i>n</i> =221)	Administrators (<i>n</i> =28)	Students (<i>n</i> =221)
Teasing, swearing, name-calling	2.75*	2.19	2.86*	2.21	2.89*	2.16
Verbal threats	2.89*	2.17	3.00*	2.26	3.07*	2.19
Theft, vandalism	2.79	2.69	3.00*	2.21	3.07*	2.29
Fights	3.43*	2.47	3.14*	2.37	3.21*	2.45
Bullying	2.71*	2.15	2.93*	2.19	3.07*	2.18
Punching, hitting, grabbing	2.82*	2.21	2.96*	2.33	3.00*	2.41
Being spat upon	2.75*	1.72	2.79*	1.97	2.91*	2.11
Ethnic conflict	3.18*	2.28	3.10*	2.32	3.20*	2.51
Sexual harassment	2.87*	2.17	3.23*	2.28	3.09*	2.41
Threat with weapon	3.32*	2.20	3.52*	2.37	3.38*	2.68

Students and Administrators ranked awareness of violent incidents on a 5-point scale: 4=Always; 3=Most of the time; 2=Sometimes; 1=Never; Undecided. Data expressed as means.

*Significance at α =.05.

4. Comments provided by administrators focused on (a) the need to increase consequences for perpetrators of school violence, (b) the fact that their own schools were relatively “violence-free,” (c) more student rules indicating a zero tolerance for violence, and (d) no mention of victims.

Conclusions and Recommendations

The following section contains conclusions reached in the study. Theoretical and practical implications along with recommendations for developing or enhancing strategies directed at prevention and response to violence in schools are also outlined.

This study was designed to explore students’ perceptions regarding their schools’ response to the victims and perpetrators of violent behaviors, and examine the variables that most influence students’ reporting of school violence. At first glance it may appear that a small proportion of the students in this study personally experienced the type of violence that gives rise to media coverage (e.g., 15.6% threats with weapons). Added to this number, however, are those students who fear the possibility of becoming victims or experience violence that has become normalized in their minds (e.g., 71% of males experiencing fighting). Finally, some of us may consider some students as mere bystanders, or what Mathews (1994) called “passive observers” of violence, who are therefore not affected. The burden of believing that little can be done to alleviate their fears, the belief that violence is normal, and fears of retaliation are findings from this study that question how passive these observers really are. The data in this study support the fact that these observers *actively* choose not to report the violence they witness.

One of the key findings from this study points to a marked difference between students’ and administrators’ perceptions of the degree to which students would report incidents of violence: administrators think that students would report much more frequently. If these differing views are generated by what appears to be an underreporting of school-based violence, who is not reporting what and why? Several explanations can be supported by the data. Very often, as the students indicated, they consciously choose to keep their victimization to themselves for fear of reprisal. Perceptions of ineffective responses or the perceived lack of teacher awareness and concern were additional factors that exerted pressure on students to accept victimization and develop alternate strategies such as taking matters into their own hands through retaliation.

If students elect to report violence, it needs to be met with a positive outcome. A number of salient comments provided by students indicated that this had not been their experience. They expressed feelings of frustration related to a belief that little could be done to change positively the anxieties and fears that accompanied actual or anticipated victimization. Unfortunately, concentrating solely on policies and practices that provide consequences for perpetrators of inappropriate behaviors compounds the number of incidents. As the students indicated, ignoring victims’ needs often leads to retaliatory behaviors and more violence.

Mathews (1994) speaks of a code of silence that can exist among staff and students that underplays the true nature and extent of violence in schools. The

results of this study suggest that the nature of this silence is multifaceted. Administrators are aware of the problem but not to the extent of relevance to the students. Obviously their impact must be stronger to be perceived by students to be effective. In many cases students consciously elect not to report incidents of violence from fear or belief that these behaviors are normal.

In many ways it is the differing perceptions (e.g., media, public, teachers, students) of the nature and extent of school violence that also serves to distort the issue. Although a rarity in the schools surveyed, the media typically still pay more attention to random incidents of weapon use than to the more prevalent occurrence of verbal and sexual harassment. Although the administrators who participated in the study were concerned over the increase in school violence, they believed it was a problem in someone else's school, not their own. Moreover, they were overwhelmingly confident that they knew what was occurring in their schools, a perception not shared by the students.

It is unrealistic to suggest that schools can eradicate all of the root causes of youth violence. However, this should not preclude schools from taking the lead by building and maintaining school environments that reject a culture of violence. In order for schools to exert this influence they must continually assess the effectiveness of current policies and practices that address serious disruptive and violent behaviors.

Central to the development of meaningful practices to address these complex problems is an interpretive perspective that includes the voice of students: victims, offenders, and witnesses. As a first step, school staff and students must be encouraged to speak freely to each other about the realities of what happens in their schools, without pressure to suppress such discussions in the name of maintaining a positive public image of the school or for fear of reprisal. Students must feel comfortable and safe that something will be done; students and administrators must be clear in their swift and consistent handling of each situation. Different strategies to deal with the three groups—victims, perpetrators, and observers—should be formulated. And the consequences for each of these should be laid out and followed.

The involvement of students in understanding and reducing school violence recognizes the important contribution our young people can offer in working toward a solution. One particular area that may be especially worth revisiting is that of victim support. A number of salient comments were provided by students expressing frustration related to their belief that little could be done to change positively the anxieties and fears that are part of actual or expected victimization. Unfortunately, aftermath support services that are designed to "address the trauma experienced by victims and witnesses of violent acts" (Day et al., 1995, p. 191) exist in few of the surveyed boards in Canada.

The conclusions drawn from this study reaffirm the need for research in this area to evolve beyond gathering statistics (largely by asking adults) on the nature and extent of violent behaviors. Although such data are useful, researchers must continue to broaden their studies to expand theories regarding the moral dilemmas, fears and challenges faced by those students who are victims or witnesses of school violence. Such knowledge could highlight areas

for improving school practices and policies that may no longer be effective in the prevention and response to violence.

The sources of youth violence are complex and diverse. Unfortunately, the issue of judging the most effective approach to prevent and to respond to violent behaviors can be just as obscure. Critical to the success of any strategy is that it effectively meet students' needs as validated by examining and understanding their experiences. For the students in this study, fear and retribution were certainly factors in their failure to report incidents of violent activity. However, the relationship of the victim to the perpetrator, whether others witness the incident, perceptions students have of how effectively victims and perpetrators are dealt with by school staff also influenced reporting. This is important information to consider when it is claimed that violence is intentionally underplayed by school staff. At the same time, student complaints that some of their victimization is downplayed cannot be ignored. We must, therefore, find a balance—drawing perspectives from both parties in our efforts to understand a complex and sensitive issue.

The classroom must be a place where teachers are able to teach, and students are provided with a safe environment conducive to learning. The next decade will challenge us all to support the obligation of staff and the efforts of students, parents, and community to ensure that learning and teaching occurs in a safe and caring school environment. Our goal will be to change attitudes such as that expressed by one of the participants in this study:

Violence is a part of this world and most people have come to accept that and deal with it by taking self-defense courses and carrying weapons. I'd like to see how you try and change the way people in the world today think. (female grade 8 student)

Note

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Research Notes: Guidelines

The *Note* should report briefly on the author's/authors' research-in-progress or recently completed research and should feature work that has not been reported elsewhere in journal publications. This current work should be situated, briefly, in the context of other pertinent scholarship, including the author's or authors' related research. The focus of the *Note* could be either a specific study or inquiry or an overview of an ongoing line of inquiry where fuller reporting of results will not occur in print for some time. The maximum length for a *Note* is 1,000 words (about 4 double-spaced pages in standard 12-point type), excluding references and one or two tables or graphs. To encourage communication between researchers, authors of *Research Notes* are asked to provide contact information such as e-mail, fax, and/or telephone numbers for publication with each *Note*. No abstract is required, but in all other respects the usual *ajer* guidelines for manuscripts should be observed.

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Cooperative and Competitive Learning Environments and Their Effects on Behavior, Self-Efficacy, and Achievement

These notes are based on the results of a study into cooperative, competitive and individualistic learning environments. It is argued that how the learning environment is defined and the associated tendencies for students to work on- or off-task are key issues affecting levels of self-efficacy and achievement among students.

The inclusion of self-efficacy as a key variable in this research has its origins in Bandura's (1986) theory on self-efficacy and the Johnson, Maruyama, Johnson, Nelson, and Skon (1981) recommendation that more work needed to be done in identifying and empirically examining variables that mediate the learning environment and achievement. More recent research indicates that self-efficacy is such a variable (Moriarty, 1994; Moriarty, Douglas, Punch, & Hattie, 1995).

Method

The research adopted a quasi-experimental design, with 179 year 5 students and their seven teachers as participants. The classes were randomly assigned to work in one of the three environments for five weeks during their twice-weekly social studies lessons. Classes then changed environments for a further five weeks. This report focuses on two of the environments, namely, cooperation and competition.

Heterogenous groups of five to six students were formed on the basis of pretests in social studies and gender in each class. Consistent with the findings of previous research the students in the cooperative groups were individually accountable for different but complementary tasks that contributed toward group goals (Johnson & Johnson, 1987, 1991) and interacted with each other (Slavin, 1987a, 1987b, 1988, 1989). In the competitive learning environment the group members were not permitted to help each other or talk about their work. For both environments groups remained constant in their membership throughout the entire period and completed tasks related to the knowledge and mapping skills components of social studies.

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Not all of the seven classes worked both cooperatively and competitively. Of interest here are classes 1, 2, and 3, which worked cooperatively in weeks 1-5, and classes 4 and 5, which worked competitively for the same period. For weeks 6-10 the classes of interest were 1 and 7, which worked on a competitive basis, and classes 5 and 6, which worked cooperatively.

The main 10-week period of the study was preceded by a lead-in period of 10 weeks in which the participants practiced working in each of the environments. Pretests of self-efficacy and achievement in social studies were given at the beginning of the 10 week period. Parallel tests were administered at the end of week 5, just before the classes changed environments and also at the end of week 10. Data were also gathered by videotaping as many of the lessons as possible in order to determine the extent to which the classes conformed with the requirements of the environments and to identify any other significant behaviors that may have affected performances on the dependent variables.

Results and Implications

Based on the outcomes of regression analyses, the results on the pretests of self-efficacy and achievement in social studies were treated as covariates for the parallel tests given at the end of the first five weeks. Similarly, the latter results were treated as covariates for the week 10 analyses.

The Scheffe *F*-tests for the week 5 results indicated that the students who worked in the cooperative learning environment had a significantly higher ($p < .05$) adjusted mean for self-efficacy (knowledge) than the students who worked in the competitive learning environment. For week 10 the cooperative learning environment had an adjusted mean for achievement (knowledge) that was significantly higher ($p < .001$) than the adjusted mean for the same variable for the competitive learning environment. The confinement of significant differences to the knowledge component of social studies, as compared with the mapping skills component, points to the importance of taking the type of task into consideration in these types of studies, as indicated by Cotton and Cook (1982).

The video analyses indicated that most of the class time observed was spent working cooperatively or competitively as expected. In summary, classes that did not use any competition maintained good behavior throughout the term. Those classes that began competitively and then moved to cooperation developed high levels of off-task behavior in the first five weeks and then had difficulty changing their behavior when the poor-behavior condition was removed. When the classes changed environments, a similar level of on- or off-task behavior tended to continue until the students had worked for several weeks in the new environment.

Where major differences occurred between environments in the degrees of off-task behaviors by students there was some degree of complementary variation in measures on the dependent variables. An example is with self-efficacy (knowledge) in weeks 1-5, when the less well-behaved students under competition performed significantly worse than the students in the cooperative learning environment, who were well behaved.

How cooperation and competition are defined has implications for practice. One of the main differences between the definitions of the two environments

was whether the students were permitted to talk to each other about their work. Recognizing that students like to interact, and giving this process both structure and legitimacy, had a positive effect with cooperation, but in competition, where students were not permitted to help each other, any interaction was likely to be off-task. The longer students learn in a competitive environment the more likely they are to demonstrate off-task behaviors. The definition of the learning environment, the length of time students are expected to work in one environment before changing to another, and the associated tendencies for students to be on- or off-task have emerged as important considerations for future research.

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Students' Attitudes Toward Physical Activity: Specialist versus Nonspecialist

Introduction

Over the last 25 years researchers have sought to determine whether differently prepared teachers have comparable success in achieving appropriate educational outcomes for elementary physical education programs that include meeting objectives in psychomotor, affective, and cognitive domains. Specifically, much research has focused on determining whether there are differences in the performances of children taught by specialists from those taught by nonspecialist teachers. In the United States, a large body of research reports has shown that children taught by specialists outperformed those taught by nonspecialists in the psychomotor domain (Baumgartner & Jackson, 1970; Faucette & Hillidge, 1989; Faucette, McKenzie, & Patterson, 1990; Nestroy, 1978; Smoll, 1974). Other research has been done to evaluate achievement in affective components (Faucette & Patterson, 1990; Patterson & Faucette, 1990; Simon & Smoll, 1974).

Patterson and Faucette (1990) conducted a study to determine if there were differences in children's attitudes toward physical activity in classes taught by specialists rather than nonspecialists. Grades 4 and 5 children from four schools in San Diego participated in the study. In two schools generalist classroom teachers taught the physical education classes, and in the other two specialists taught them. The researchers used the Children's Attitudes Towards Physical Activity inventory (CATPA) developed by Simon and Smoll (1974). Discriminant function analysis (Chi Square) indicated a significant difference between the attitudes of children taught by specialists as opposed to nonspecialists. Patterson and Faucette (1990) further stated that despite this significant difference, examination of the practical indices suggested that the discriminant function was not very effective. Thus they concluded that the attitudes toward physical activity were similar for the children in their study regardless of the type of teacher. These results conflict with those of Figley (1985), who found that students rated teachers as the most important determinant of attitudes toward physical education. Patterson and Faucette (1990) suggested that similar studies be carried out in a situation where the children were consistently exposed to either a special or nonspecialist teacher.

This study was designed to examine the impact of the type of teacher on attitude formation in a Canadian context. Thus the purpose of this study was to determine differences in the attitudes of junior (grades 4, 5, and 6) elementary

students toward physical activity when taught by either a physical education specialist or a nonspecialist. The terms *nonspecialist* and *specialist* are used in the following sense. Nonspecialist is defined as an individual without recognized physical education training. Specialist is defined as an individual with physical education training through an undergraduate university program. The null hypothesis tested is: There is no significant difference in the mean scores between the students' attitudes taught by specialist and nonspecialist physical education teachers on the CATPA instrument. Differences due to gender or grade were tested as well.

Research Design and Context

Six urban elementary schools participated in the study. Three elementary schools were selected from Nova Scotia, the Dartmouth County Board of Education containing the specialist-taught physical education programs, and three elementary schools from the Lakehead Board of Education containing nonspecialist physical education programs. Regional and economical conditions are similar in both areas where the Children's Attitudes Toward Physical Activity (CATPA) instrument was used. This is important because we assumed that the geographical location and the type of climate affect life and activities. Also, economically the two districts are similar, dedicated to fisheries and forestry. School populations varied by no more than 75 students. The selection of schools in each board was made from a pool of schools willing to participate.

Students from a total of 36 classes ($n=887$) completed the Children's Attitudes Towards Physical Activity (CATPA) questionnaire (Simon & Smoll, 1974). Eighteen of the classes were located in each of the two school districts. The 18 classes were made up of six classes from each of the three schools. The six classes were made up of two classes each from grades 4, 5, and 6 at each of the three schools. The questionnaire was administered to the students in their homeroom classes. There were 428 students (227 girls and 201 boys) taught by nonspecialists and 459 students (244 girls and 215 boys) taught by specialists. The distribution of students by grade in both groups was not drastically different.

All students received the CATPA questionnaire within two weeks of each other. The questionnaire was administered in the morning. There were no physical activity periods for these classes during the days they responded to the questionnaire.

Some Findings

The participants' scores on the Children's Attitude Toward Physical Activity Inventory (CATPA) were analyzed by a 2 group x 2 gender x 3 grade level factorial analysis of variance (ANOVA) with $\alpha=0.05$. Table 1 presents the SPSS output for the Group x Gender x Level factorial analysis of variance (2x2x3 ANOVA). Table 1 suggests that significant main effects were found for the Group variable, $F=62.928$, $p<0.05$ and for the Gender variable, $F=10.617$, $p<0.05$. No significant main effect, $F=2.311$, $p>0.05$, was found for the third variable (Level).

In order to interpret clearly the results in Table 1, we examined the three-way Group x Gender x Level interaction (effect) and the two-way Group x

Table 1
2 x 2 x 3 Factorial Analysis of Variance: CATPA Grand Mean

Source of Variation	SS	df	MS	F	p
<i>Main Effects</i>	517.081	4	129.270	20.188	.000*
Group	402.947	1	402.947	62.928	.000*
Gender	67.986	1	67.986	10.617	.001*
Level	29.598	2	14.799	2.311	.100
<i>2-Way Interactions</i>	139.647	5	27.929	4.362	.001*
Group Gender	3.206	1	3.206	.501	.479
Group Level	96.353	2	48.177	7.524	.001*
Gender Level	34.814	2	17.407	2.718	.067
<i>3-Way Interactions</i>	74.233	2	37.117	5.796	.003*
Group Gender Level	74.233	2	37.117	5.796	.003*
Residual	5,602.867	875	6.403		
Total	6,333.827	886	7.149		

* $p < 0.05$.

Level interaction (effect), which were found significant at $F = 5.796$, $p < 0.05$, and $F = 7.524$, $p < 0.05$ respectively.

Examination of the Three-Way Interaction

To examine the Group x Gender x Level interaction, we used the means for each Group over Gender x Level (Table 2).

Using *Mathematica*, we used a surface plot of these points in Table 2 for Group 1 and of the points for Group 2 to obtain a graphic interpretation of the Group x Gender x Level interaction.

We observed that (a) there was a significant 3-way Group x Gender x Level interaction; (b) Group 1 (Specialist) exceeds Group 2 (Nonspecialist) at all points; (c) Group 1 is pretty consistent across the three levels and regardless of whether the students are male or female.

Table 2
Grand Means by Gender and Level

	Level 4	Level 5	Level 6
<i>Group 1 Specialist</i>			
Female	20.59 (92)	20.09 (82)	20.41 (70)
Male	20.10 (67)	19.51 (73)	19.48 (75)
<i>Group 2 Nonspecialist</i>			
Female	19.20 (67)	19.62 (76)	17.98 (84)
Male	17.55 (71)	19.21 (56)	18.72 (74)

Note. Values enclosed in parentheses represent the size of the cells (n).

Concluding Comments and Discussion

The issue of retaining specialist teachers should revolve around their impact on the students. Educational planning should place the student at the center of all programs. Previous studies (Clarke, 1971; Nestroy, 1978) have outlined the fitness and motor benefits the specialist provides students. In contrast with the findings of Patterson and Faucette (1990), this study suggests that in the Canadian contexts studied the specialist teacher also has a positive effect on the attitudes of the students.

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Richard McLean

Selected Attitudinal Factors Related to Students' Success in High School

Students' attitudes that affect educational achievement are complex. These attitudes reflect the influence of a number of affective variables that form part of the academic make-up of the student. Students' cognitive ability does not always help researchers or educators to predict student achievement; consequently, relying solely on cognitive theories to account for student academic performance is not conclusive. Other factors appear to be at work in the lives of students that influence their scholastic performance and preclude basing academic results on ability alone. Students' attitudes toward schooling (Anderson & Young, 1992), toward other significant people in their lives (Fehrman, Keith, & Reimers, 1987; Galbo, 1994), and their own perceptions of personal academic achievement (Felson, 1984; Marsh, 1990) affect their educational outcomes.

The literature on learning in the affective domain reveals several sub-categories (Krathwohl, 1971; Krathwohol, Bloom, & Masia, 1964). These sub-categories, when placed on a continuum,, illustrate the increasing specificity with which educators must deal as they seek to understand the impact of affective factors on student achievement. Figure 1 shows the affective domain of human learning in expanded form with the relationships between and among selected affective descriptors from the School Attitude Measure (Wick, 1993).

Context and Research Design

In spring 1995 the School Attitude Measure (Wick, 1993) was administered to selected students at four high schools in Northwestern Alberta. The study is ongoing, with information being gathered annually at the largest of the participant schools.

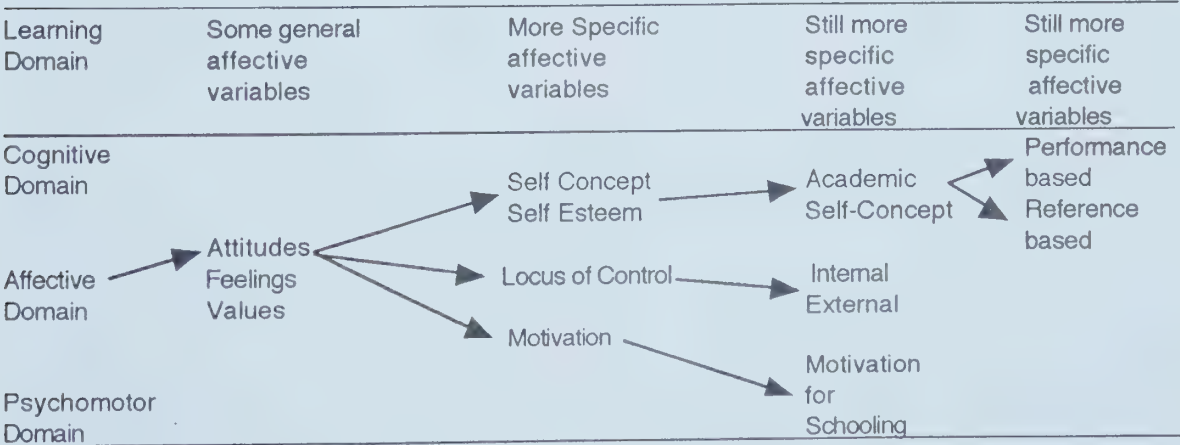


Figure 1. Affective domain continuum.

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A purposeful sampling design that provided maximum variation between groups comprising the sample was used. A sample of 69 high-achieving matriculation students, and 55 low-achieving general diploma students participated in the study. The basis for including matriculation students was final grades of 75% or above in English 20 and Mathematics 20. Inclusion of general diploma students into the study was based on final grades of 55% or below in English 23 and Mathematics 23.

The School Attitude Measure (Wick, 1993) allowed the researcher to gain basic information about several dimensions of student attitudes toward school and to gain significant data concerning the relationship between students' attitudes and school performance. Students' responses to items from the School Attitude Measure were gained from Likert-scale choices that were presented in the following manner: never agree, sometimes agree, usually agree, and always agree. Level K/L of the Student Attitude Measure, designed for use with students from grades 9-12, was used to determine student scores for the following five attitudinal descriptors:

- Motivation for Schooling: "how students reactions to past school experiences are affecting present motivation in school" (Wick, 1990, p. 2);
- Academic Self-concept Performance Based: "student feelings about school performances and confidence in academic ability" (Wick, 1990, p. 2);
- Academic Self-Concept Reference Based: "how the student thinks other people feel about his or her school performance and ability to succeed academically" (Wick, 1990, p. 2);
- Locus of control: "students feelings about whether he or she is responsible for school outcomes or whether such outcomes are the result of luck, fate or other vicissitudes" (Wick, 1990, p. 3);
- Student Instructional Mastery: "asks student to report on his or her actual school skills" (Wick, 1990, p. 3).

Some Findings from the Study

Higher mean scores for the upper group on all five descriptors of the School Attitude Measure indicated that these students tended to see themselves as academically competent; able to control their own academic destiny; and favorably viewed by peers, parents, and teachers. Lower mean scores for the lower group suggested these students were less willing to view themselves as able to influence their own scholastic outcomes; see significant others as favorably disposed toward them as learners; or to respond positively about their past academic experiences. Independent *t*-tests were conducted to compare the means of the upper and lower groups for each attitudinal descriptor. Preliminary analyses revealed statistically significant differences for each of the attitudinal variables under study. Upper and lower group means as well as computed *t* values are shown in Table 1.

Discriminant analysis was used to determine which attitudinal factors could significantly differentiate between upper and lower groups of students based on their responses to the questionnaire.

The results presented in Table 2 revealed substantial attitudinal differences between the two groups based on student responses to the questionnaire. However, two attitudinal variables, locus of control and academic self-concept

Table 1
Group Means

	Upper Mean	Lower Mean	t (122)
Motivation for Schooling	55.13	46.98	5.43
Academic Self-Concept (Performance Based)	54.13	45.20	4.84
Academic Self-Concept (Reference Based)	53.83	44.20	5.63
Locus of Control	66.26	58.38	6.15
Instructional Mastery	52.10	45.51	4.50

(reference-based), were chiefly responsible for the differences between the two groups.

Concluding Comment

Findings from this study showed significant attitudinal differences between high- and low-achieving students on all five attitudinal factors comprising the research instrument. As well, two attitudinal variables, locus of control and reference-based academic self-concept, accounted for most of the difference between the upper- or lower-achieving groups.

Results from this study support the findings of previous researchers and indicate that reference-based academic self-concepts are especially significant for a student’s academic achievements. In addition, there are strong indications that students in the upper group were more likely to feel that their parents, peers, and teachers were positive about their school performance and ability to be successful than were students from the lower group. This corroborates the determinations of earlier researchers who indicated the existence of strong connections between a student’s academic achievement and relationships with parents, peers, and teachers (Doise & Mackie, 1981; Felson, 1989; Galbo, 1994; Seginer, 1983; Silvernail, 1985).

The findings of this study also indicate that locus of control scores are discriminators that can powerfully distinguish between individuals in high- and low-achieving groups. Results for the upper group showed significantly more internal locus of control than did results for the lower group. Upper

Table 2
Results of Discriminant Analysis

Variable	Chi Square Values	p
Motivation	2.16	.141
ASC Perf. based	3.34	.068
ASC Ref. based	7.80	.005*
Locus of Control	13.77	.0002*
Inst. Mastery	0.50	.482

Note. n=124 for each variable.
*p ≤ .05.

group members were much more willing to report that they were responsible for their own academic successes than were lower group members who were more likely to attribute their academic outcomes to external influences. These results mirror the findings of earlier researchers who reported strong and positive connections between a student's locus of control and academic achievements in school (Kohn, 1994; Lefcourt, 1976; Lessing, 1969; Zimmerman, Bandura, & Martinez-Pons, 1992).

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Increasing Awareness of Learning Disabilities

Senior undergraduate and graduate university students who participated in this study have a learning disability (LD) and/or attention deficit disorder (ADD/ADHD). These unusual difficulties in reading, writing, mathematics, or attention often result in far-reaching negative consequences including early school leaving, underemployment, and higher incarceration rates than in the general population (Norton & Falk, 1992; Richardson, 1994; Smith, 1991; Vogel, 1993). From childhood on, how a person with LD is treated influences education, employment, lifestyle, and self-worth (Karassik, 1989; Pompian & Thum, 1988; Smith, 1991).

Both specific learning disabilities and attention deficit disorders are controversial concepts. The controversies include lack of universal definitions (Elkind, 1990), nonconsensus on cause and treatment (Just & Carpenter, 1987), even whether people experiencing these difficulties should be told they have a learning disability (Adelman & Wren, 1990; Moats & Lyon, 1993; Searfoss, 1994). The literature overall does make it clear, however, that LDs are lifelong and that generally ADD/ADHD is too; further, both have a tendency to run in families (American Psychiatric Association, 1994).

The principal symptom of an LD is a pronounced difference between seeming potential and tangible achievement (Whyte, Kovach, & Vosahlo, 1993). As early as elementary school students with LD may be considered lazy, indifferent, or obtuse (Murphy, 1992). In the present study, four of the eight participants said they had been held back a grade or would have been but for a parent's or teacher's intervention. Not surprisingly the difficulties experienced at that time are the same difficulties they experience now, despite being either third- or fourth-year undergraduates, or in one case a graduate student. Until becoming involved in the Program for Students with Learning Disabilities (PSLD), many took classes reported to be easier, avoiding those where they had interest but were concerned they would fail.

However, with suitable accommodations, they and many learning disabled persons aspire to, and complete, postsecondary and graduate studies (Adelman, O'Connell, Konrad, & Vogel, 1993). This study investigated university students' perceptions of their learning disabilities and how the disabilities have affected and continue to affect them. Students were either currently using LD support services or had used them earlier in their university careers.

Results and Recommendations

The participants. Three of the women and all four men reported having reading and/or writing difficulties. One woman and two men also said they had difficulty with mathematics. Two women and two men stated they had difficulty with attention or ambient noise, and one woman and one man

described problems with memory. Four participants remembered being tested as children, although by what means was unknown; in three cases there was no follow-up. Only one person told of continuing support through elementary and secondary school. Seven of the eight participants were diagnosed at university as learning disabled.

Because LD diagnosis is relatively new (Malaspina College, 1989), none of the participants' parents had been diagnosed, although many did not complete or even begin secondary school. In some cases this seems to have been because of economic necessity, although others were not so clear. Most participants, that is, all four women and two men, were of the opinion that at least one other immediate family member also had a learning disability. In some cases their siblings or children or extended families had been diagnosed.

The perceived worst negative academic and social effects of the LDs were as individual as the participants, but appeared to relate directly to the specific LDs. Various everyday reading and writing situations were by far the most often stated negative effect. These included reading greeting cards, reading books to children, filling out forms, recreational word games, and job choices.

Early Diagnosis

It is clear that having a learning disability significantly affects people's lives, most often in negative ways (Fargason & Ford, 1994) and that the eight students in this study favor early diagnosis of the difficulty.

Much of the schooling for persons with LD is clouded by frustration and embarrassment, and they may be seen as either intelligent students who are lazy or unmotivated or as students who simply are not academically capable of much. These sorts of experiences had unquestionably permeated the earlier schooling of the current study's students. The Learning Disabilities Association of Canada (1991) contends that diagnosis, with subsequent labeling is necessary for effective teaching.

Definition

A key factor in early diagnosis is the need for a universally acceptable definition of learning disabilities (Malcolm, Polatajko, & Simons, 1990); this may also reduce the present associated stigmas.

Schooling

Because early diagnosis, despite valid concerns, appears desirable, increased awareness is necessary, particularly in teachers and education students. Participants' earlier experiences indicated that few of their teachers were alert to the possibility of students' LDs. Participants, some of whom were education students, noted that little has changed in this respect. More than ever, with increased mainstreaming in earlier schooling, it is vital that education students be taught to recognize possible LDs in their future students.

Despite the more desirable teacher-to-student ratio and especially trained teachers, there are drawbacks to schools dealing exclusively with LD students. Social ineptness may be the most detrimental. Further, given the importance participants attributed to sports and arts, often not available at special schools, these activities may not be extracurricular; for many they may be vital to high school completion.

Gender

Given the gender balance of present students and a similar ratio in PSLD, it is also recommended that the gender skewedness disparity between this study and many others be investigated. Wood (1985) conjectures that LDs "may be as high among females" (p. 546). Fargason and Ford (1994) say there may also be more females with ADD/ADHD than previously has been recognized. There may also be more males with ADD. Because these youngsters are often among those who are noted as daydreaming or not paying attention, but do not display disruptive behaviors, they may not be diagnosed (Barkley, 1991; Lubar, 1995).

That these possibilities warrant further research is borne out by two different studies, both yielding LD gender similarity. Mellard and Byrne's four-year (1993) quantitative study of 1,400,680 students in 103 California colleges found approximately the same percentage of LD women and men. In the current qualitative study of eight Canadian university students, genders were also equally represented. As both this study and Mellard and Byrne's (1993) study contradict earlier research in the field of learning disabilities, further research into ostensible skewedness is also certainly in order.

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Book Review

Social Justice and Language Policy in Education: The Canadian Research. David Corson & Sylvie Lemay. Toronto, ON: OISE Press, 1996.

Reviewed by *Kelleen Toohey, Simon Fraser University*

Social Justice and Language Policy in Education: The Canadian Research by David Corson and Sylvie Lemay provides a review of recent Canadian literature concerned with language policies and practices in educational settings with regard to the "five groups [that] seem most affected by unfair language policies in education: aboriginal students; female students; official-language minority students; students from immigrant, refugee and signing Deaf backgrounds; and students who are users of non-standard varieties of Canada's immigrant or official languages" (p. 1). Through examination of the literature concerning these groups and the educational language policies and practices that affect them, the authors aim at "highlight[ing] ways of removing major injustices" (p. 1).

The book opens with an introductory chapter in which the boundaries of the project are explained and the authors' notion of social justice is described. The project examined work published during 1984-1995 that concerned "language policies and practises relevant to the compulsory years of education" (p. 3) with regard to the five groups identified. Although the introduction and commentary throughout are in English, both English and French literature was examined and each summarized in its appropriate language without translation.¹

The authors' notion of social justice is acknowledged as being borrowed from Corson (1993). Recognizing that "education and the language practices that it legitimates, can routinely repress, dominate, and disempower language users whose practices differ from the norms that it establishes" (p. 10), Corson and Lemay see some students as routinely disadvantaged by the fact that the "linguistic capital valued in schools is only partially available to the majority of children who come from class, gender, or cultural backgrounds that differ from the school-recognized norm" (p. 10). This understanding of how some groups of learners are privileged and others disadvantaged in schools is the ideological background against which the research is read. The authors then briefly review Habermas' (1979) "discourse ethic," arguing that the procedures for determining locally and situationally derived notions of social justice outlined by Habermas will be useful in negotiating specifically Canadian "just" practices in language education.

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I found the discussion of social justice and Habermas to be less helpful in setting up the examination of Canadian literature on language policy than I had hoped. Its brevity is probably responsible for this difficulty, but its focus also appears slightly different from what the book as a whole offers. Although the authors have selected literature for review that documents, describes, examines, and explains situations where students who are other than white, anglophone, male, Euro-Canadian, hearing, and speakers of standard English are treated in what they judge to be problematic or unjust ways, the social justice discussion provides a framework for the development of environments where socially just policies and practices might be negotiated. The description of procedures for coming to social justice with regard to language and education seems unrelated here to documentation of manifestly unjust situations (what the literature review mainly offers).

In addition, critiques of Habermas' idealist and rationalist perspectives are not here taken up, and we are left with questions as to how power relations between interlocutors developing "discourse ethics" are to be understood. Corson and LeMay's statement, for example, that "a basic requirement of the discourse ethic is that power factors be excluded as much as humanly possible from debates and discussions that deal with important human interests" (p. 16) seems unrelated to my notions of how power and discourse operate, and also to the explicitly political ideological background the authors earlier set up with regard to schools and language. I also want to understand better the notion of the locally derived justice they advocate and to understand how this might make a difference in any particular setting. I am not clear as to how this formulation is necessarily helpful in examining the literature in the study, which, as one would expect, comes from such a variety of viewpoints about justice, politics, inclusion, and so on. In later stating that "women and girls [are placed] in a disadvantageous position in society" (p. 43) and that "Canadian education plays [a role] in creating unjust gender arrangements in society" (p. 43), for example, the authors, of course, have general notions of what justice might be. Rather than forefronting here the argument that justice is locally contingent and should be locally negotiated, what I believe is needed here is precisely the contrary, a more general statement of the authors' positions with regard to matters of social justice and language, which would be helpful in situating their reading of the literature they present.² A statement of the general outlines of a theory of social justice and language in Canada would also help to make those ideas thinkable (in Greene's, 1988, sense) in ways they have not been heretofore.

I paid particular attention to the chapters concerning aboriginal language policy, gender and language policy, and immigrant and refugee minority language policy, as these are areas in which I have written and conducted research. The discussions in these chapters that set up the review of the literature are, in some cases, somewhat simplified, again probably because of the brevity of the accounts. With more detailed historical and contemporary information about specific locales and communities, and with recognition of the asynchrony of practices in various institutional settings, the worth of *idées reçues* about particular groups and events, many of which are contested in other literature (e.g., "The history of contact between indigenous peoples and

their colonizers has been a steady escalation of pressures on the aboriginal people to conform to the imposed cultures," p. 19) becomes less obvious. There was not a great deal of this throughout the book, as the introductory and linking text, which does not review a specific study or source, is quite minimal. Despite a commendable breadth in reviewing available literature, the authors acknowledge the difficulties of access to the efforts of local communities in curriculum development and analysis, recognizing that the avenues they explored may not be accessible (or relevant) to people who are doing research on language policies and practices in their own communities. They also helpfully point out the dearth of studies on gender and language in Canada.

The reviews provided are interesting, informative, and to my knowledge accurate and should aid other researchers in conceptualizing future work, contacting colleagues in other domains, and building on findings of others. The individual chapters concerning the five targeted groups are organized around themes that arise from a consideration of the body of literature on the topic, and not from any a priori decisions about what the literature should treat. I found myself wondering, however, about comparability with regard to themes across the groups, flipping back and forth to see if a theme identified for one group was present in literature on another group. Organizing in such a way might have been useful in helping readers to assess research activity in particular areas and to identify areas where further activity might be profitable.

On the whole, I think the compilation offered here will be useful to other researchers, students, and policy and curriculum developers. The breadth of the research examined and the competence that is displayed in summarizing those pieces of research with which I am familiar makes one confident that this review provides important baseline information about situations, research questions, results, findings, and so on. As such, I believe it will be an often-consulted resource.

Notes

1. This decision to publish excerpts in French without translation is one I support wholeheartedly. It is reflective of the authors' commitment to represent as accurately as possible the intents of authors; it underlines a commitment to regard those languages and that research as resources of the community as a whole; and, finally, even for a scholar with a beginner's knowledge of French, meaning is clear and accessible.
2. Statements that allow us to understand what they mean by repression, domination, and disempowerment would seem more helpful in this regard.

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Contents

Articles

<i>Nina Bascia</i>	69	Invisible Leadership: Teachers' Union Activity in Schools
<i>Patricia M. Rowell</i> <i>Brenda J. Gustafson</i> <i>Sandra M. Guilbert</i>	86	Problem-Solving Through Technology: An Interpretive Dilemma
<i>Anthony W. Bartley</i>	99	Enhancing the Validity of Portfolio Assessment in Preservice Teacher Education
<i>Grace V. Malicky</i> <i>Moirá F. Juliebö</i> <i>Charles A. Norman</i> <i>Judy Pool</i>	114	Scaffolding of Metacognition in Intervention Lessons
<i>Teena Willoughby</i> <i>Mary Motz</i> <i>Eileen Wood</i>	127	The Impact of Interest and Strategy Use on Memory Performance for Child, Adolescent, and Adult Learners
<i>Irene M. MacDonald</i>	142	Violence in Schools: Multiple Realities
<i>Research Notes</i>	157	Guidelines
<i>Keith F Punch</i> <i>Beverley Moriarty</i>	158	Cooperative and Competitive Learning Environments
<i>Medhat Rahim</i> <i>Taralee Marriner</i>	161	Students' Attitudes Toward Physical Activity
<i>Richard McLean</i>	165	Selected Attitudinal Factors
<i>Julia A. Nielsen</i>	169	Increasing Awareness of Learning Disabilities
<i>Book Review</i> <i>Kelleen Toohey</i>	173	<i>Social Justice and Language Policy in Education: The Canadian Research</i>

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